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ERRATA NOTICED.

Page 12,	36th line. for Rattery, read Rattray.
" 38,	37th line, for Mantitia, read Manettia.
" 129,	21st line, for Collectobrichium, read Colletotrichum.
" 258,	4th line, for Inguilinarum, read Inquilinarum.
" "	28th line, for "the only original," read "only the original."
" 283,	21st and 22d lines, at the ends of the lines, the word "normal" belongs on line 22, and the word "types" on line 21.
" 287,	9th line, for Leptorhrœa, read Leptorhœa.
" 289,	4th line, for Everbatia, read Everhartia.
" 292,	4th line, for tuba, read rubra.
" 294,	4th line, for Heurya, read Henrya.

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BULLETIN

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TORREY BOTANICAL CLUB.

Vol. XVIII.] New York, January 20, 1891. [No. 1.

Notes upon Uvularia, Oakesia, Diclytra and Krigia.

By Theodor Holm.

(Plates CXI–CXIII).

Uvularia perfoliata and Oakesia sessilifolia.—These two species have been hitherto united in the genus *Uvularia* of Linné, but have recently been separated by S. Watson,* on account of differences in the leaves, whether they are "perfoliate or sessile," the position of the flowers, whether they are "terminal or not," and the structure of the capsule, whether it is "three-lobed or three-winged." There are, however, other characters taken from the rhizome, which are not less important, although they may not even in connection with the above mentioned characters, be sufficient to distinguish them as representing two genera. The descriptions in systematic works of the rhizome of these two plants are generally defective.

A. Michaux † says of the genus *Uvularia* "Radix fibrosa, aphylla," but does not supply any special characters for the rhizomes of the different species. Barton ‡ describes *U. perfoliata*, as having "root white, palmate divisions cylindrical, garnished with a few yellowish-white radicles," while he in the second volume of the same work mentions the rhizome of *U. sessilifolia* "Root perennial, fleshy, whitish, resembling the root of *U. perfoliata*." He gives a very good illustration of the species *perfoliata* and figures the anterior part of the rootstock, but without showing stolons. John Torrey* describes *U. perfoliata* as having "root a tuft of fleshy fibres," and Kunth† says merely "Rhizoma repens" as a character for the whole genus, and we find the same in Darlington's‡ and Chapman's Manuals§. A more complete description has been given, however, in the sixth edition of Gray's Manual, where *Uvularia* has been characterized as having a "short rootstock with fleshy roots," while "a slender, creeping rootstock" has been attributed to the genus *Oakesia.*

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* Proceedings American Acad. Vol. XIV.

† Flora Boreali-Americana, Vol. I, 1803, p. 199.

‡ Flora of North America, Vol. I and II, 1822.

But the fact that *Uvularia* possesses long, subterranean stolons, seems certainly hitherto to have been overlooked.

In *Uvularia perfoliata*, the main rhizome of the full-grown and flowering plant is hardly one line long, and is entirely concealed by the roots. These are whitish, fleshy and cylindrical, thickest at their upper extremity and then taper gradually towards the end; their length is from two to three inches on full-grown specimens, and they are but sparingly branched. Besides this part, the main rhizome, there are regularly two stolons to be observed, one on each side of the base of the flowering stem. Plate CXI, Fig. 1 illustrates the rhizome of an old plant, and we see here the two stolons each with its prophyllum at the very base. This prophyllum is about three lines long, triangular, but sheathing for half of its length. The stolons are covered with long, scale-like leaves, more than an inch in length, which form closed sheaths around the internodes. The apex of these leaves is free, triangular and a little curved. The stolons do not run in a straight line under the surface of the ground, but are slightly bent at each internode. The end of the stolons may strike root and the bud will then develop a new plant, while the other part is entirely destitute of roots and fades away early in the spring. At that time the young plant has been provided sufficiently with roots, similar to those described above, and does not need any longer to be in connection with the old individual from which it has been formed.

Oakesia sessilifolia. The rhizome of this plant is entirely different from that of the preceding. It is relatively long, about six inches or even more, and it shows a few stretched internodes. Plate CXI, Fig. 4 illustrates a rhizome of the full grown plant, and we see here that the roots have almost the same size and shape as those of *Uvularia*, but show, however, several ramifications. The leaves of the rhizome are scale-like and clasping, although not sheathing, and the internodes are cylindrical, almost straight. The anterior part of the rhizome carries two scale-like leaves, surrounding the flowering stem, at the base of which two branches are to be observed. The one (Br. 1) is long and has been formed this summer. It consists already of two internodes, and one root has been developed, similar to those of the older part of the rhizome. Another branch (Br. 2) has also been formed, but does not show yet more than one internode, and no roots have been developed. They are both secondary branches, and the main rhizome being a monopodium from its first development until terminated by the flowering stem, has now been changed to a sympodium, while the branches themselves will show a monopodial ramification, until again terminated by flowering stems. These branches of the rhizome will not be developed as stolons, even if it might look so, when we consider the whole rhizome; they show the same form and structure as the main rhizome and will not be separated from this, like the stolons of *Uvularia*.

---

* Flora of New York, Vol. II, 1843.

† Enumeratio Plantarum, Vol. IV, 1843, p. 200.

‡ Flora Cestrica, 1853, p. 328.

§ Flora of the Southern United States, 1883, p. 486.

These two plants are therefore easily distinguished simply by their rhizomes, and we shall see farther that their internal structure also may furnish several good characters. We will then compare the structure of some of the corresponding organs and commence for instance with the roots. As mentioned above these are thick and fleshy in both plants, due to a considerable deposit of starch in the bark. The cells of the epidermis (Plate CXII, Fig. 12) are thin-walled in both species, and the bark, which occupies the greater part of the root, consists of relatively large, cylindrical cells, entirely filled with starch. In regard to these two tissues, the epidermis and the bark, our plants do not show any difference, but if we consider the innermost part of the root, we will see a somewhat different structure. The cells of the endodermis show very thin walls in *Oakesia* (Fig. 8) where also the spots called after Caspary are very distinct in contrast to *Uvularia* (Fig. 7) where the endodermis is thickened. The size of the cells of the pericambium is also different; it is largest in *Uvularia*. Inside the pericambium we see the fibro-vascular bundles in a number of about twenty in *Oakesia*, but only about ten in *Uvularia*. The groups of phloëm are relatively larger in *Uvularia* and the xylem shows a stronger development in regard to thickness than in *Oakesia*. As regards the stem overground, we shall also here be able to find a few characters. It is solid in *Oakesia*, but hollow in *Uvularia*. The cells of epidermis do not show any difference; their exterior walls are rather thick in both, with a distinct cuticle. A quite strong sheath of mechanical tissue forms a ring around the fibro-vascular bundles, separated from the epidermis in *Oakesia* by only one stratum of bark-cells, while in *Uvularia* there are two distinct strata between the epidermis and the mechanical tissue. This last consists of about five layers in *Oakesia* and but two in *Uvularia*.

On turning to the structure of the leaves, the epidermis shows the following differences: The cells are relatively much larger in *Uvularia* on both faces, and if we consider simply the inferior face, where the stomata are present, the walls of the cells show a more distinct undulation in *Uvularia* than in *Oakesia*. The superior face is perfectly destitute of stomata in both plants. A transverse section of the leaves shows also that the cells surrounding the stomata are much broader in *Uvularia* (Plate CXI, Fig. 5). But otherwise in regard to the interior structure of the leaf, there was not to be observed any essential difference. Figs. 9 and 10, Plate CXII, illustrate a transverse section of the midrib, and we see here in both plants that the cells of the epidermis show rather thick walls with a distinct cuticle, and we find inside an almost collenchymatous tissue of about two strata (Fig. 11). The fibro-vascular bundles are relatively larger in *Oakesia*, and are not surrounded by any mechanical tissue neither in this nor in *Uvularia*.

The anatomical characters of these two plants are then:

THE ROOT.

The cell walls of endodermis are thickened in *Uvularia*.
The cell walls of endodermis are thin in *Oakesia*.
About ten fibro-vascular bundles in *Uvularia*.
About twenty fibro-vascular bundles in *Oakesia*.

THE STEM.

Hollow in *Uvularia.*

Solid in *Oakesia.*

There are two strata of bark-cells between epidermis and the mechanical tissue in *Uvularia.*

Only one stratum in *Oakesia.*

The mechanical tissue consists of about two strata in *Uvularia.*

The mechanical tissue consists of five strata in *Oakesia.*

These two species show then quite a considerable difference in regard to their vegetative propagation and tendency to spread. The one, *Uvularia*, has a very short subterranean stem, but long stolons, which are soon able to develop new plants, therefore it occurs always abundantly where it grows. The other one, *Oakesia*, has a long, creeping rhizome without any formation of stolons; this manner of propagation is evidently not as important as the first one, where stolons were present. There is at least not to be observed so large a number of plants growing together as is the case of *Uvularia.*

Diclytra Cucullaria. "A cluster of grain-like tubers, crowded together in the form of a scaly bulb," is the only description which has been attributed to the rhizome of this plant in the sixth edition of Gray's Manual of Botany. It is rather astonishing that nothing more has been remarked upon this subject, the structure of these so-called "tubers" of a plant so common and well-known, as it is among the earliest-blooming of our flora. It does often happen, however, that these common species escape the attention of the botanists, thus they become at once well-known and not known at all; it seems at least to be the case with this plant. We shall see later that our plant does not possess any tubers at all, and that the rhizome shows a very interesting structure; in spite of that the author has been unable to trace the development of it from the very earliest stage of the germination. If we dig up the plant in the early spring, for instance in the month of March, when it is just commencing to bloom, we then see a rhizome, consisting of a number of light rose-colored tuber-like bodies, covered with dark crimson spots and clustered together so as to form a scaly bulb. We shall see farther that the size of these tuber-like bodies is different, there being always a few which are much larger than the others, but there does not seem to be any regularity in regard to their position on the rhizome, only that there are often two or three of these larger ones situated closely together. We see farther that the vegetative and floral shoots at their base are surrounded by some scale-like, membranaceous leaves. By separating the "tubers" from the rhizome (Plate CXIII, Fig. 14) it is plainly seen to consist of a number of very short branches, some of which are terminated by an inflorescence or carry a few, (two or three,) normal leaves besides the scale-like ones. The roots are scarce, slender and proportionally weak. Now, in regard to the mentioned tuber-like bodies, these, the smaller ones, are almost conical, slightly flattened at their ventral face and shortly pointed, in contrast to the larger, which are distinctly triangular in outline with obtuse edges and show a scar at their apex, which proves that they have carried something. Still there is nothing yet to explain their origin, before we have removed the scale-like leaves. Inside these we shall find, (Plate CXIII, Fig. 15) in their axils, several clusters of minute "tubers," very much like those observed before, but these show at their summit a rudimentary toothed blade, and are nothing but leaves (Plate CXIII, Figs. 16–17) situated on a short axis. At the same time, during the removing of the scale-like leaves the base of the normal ones becomes free and shows nearly the same form as the larger tuber-like bodies, only with the exception that they are in connection with the long petiole and the large, finely divided blade. The large "tubers" represent then merely the base of now partly faded normal leaves.

There is, however, a shorter way to find out the origin of these tuber-like organs, if we will contemplate the plant at an earlier stage. Numerous minute, one-leafed specimens are always occurring around the mature plants, and these, illustrated in Figs. 18–20, are undoubtedly developed from the above mentioned smaller tuber-like leaves, which, as will be shown later, commonly support a very minute bud (Plate CXIII, Fig. 23). It was my first thought that they were developed from seeds and in a secondary stage, probably one year old, but it seems to be the only correct explanation to offer, that they were developed from the small tuber-like leaves. It is also to be pointed out that these drop easily away from the main rhizome, enclosing at their base an axillary bud. Another reason is, that not a single germinating plantlet was to be found in spite of very careful search at different seasons of the year, and when I later collected the fruiting specimens, no seed was contained in the fruits. Plate CXIII, Fig. 18 shows then a young plant, consisting of an almost globular, tuber-like body, with the characteristic scar at its apex, and supporting a short axis, carrying a large scale-like leaf, inside of which a normal one has been developed. One short root is coming out below the scale-like leaf, while two are to be observed at the base of the older normal one. The number of scale-like leaves seems to vary; we see in Fig. 19 a specimen of the same age, where three are present. And if we will now examine the base of the young normal leaves, as well of the scale-like ones, we shall again find small clusters of tuber-shaped leaves with rudimentary toothed blades (Plate CXIII, Fig. 17). A few weeks later we will see that the young specimens have continued their growth so as to throw off the scale-like leaves, while the base of the normal leaf shows a considerable swelling, forming a tuber-like body, but with the other parts of the leaf still persisting (Fig. 20). Later in the summer, for instance in the month of August, the mature plant has dropped the inflorescences and the normal leaves, the rhizome being the only surviving part. It shows now the same aspect as that figured in Fig. 14, but with the exception that distinct, whitish buds are to be observed among the fleshy, tuber-like leaves. Plate CXIII, Fig. 22 shows a bud surrounded by several of these, of which three have been figured, the others having been removed, but of which the scars show their position upon exceedingly short branches. The bud itself carries four scale-like membranaceous leaves, inside of which there will be developed the following year some normal leaves and probably an inflorescence. And at the same time we will observe that the tuber-like leaves show a minute but distinct cavity at the base which contains a bud (Plate CXIII, Figs. 23 and 24) able to develop an independent plant as soon as it, together with the tuber-like leaf, has dropped from the rhizome.

The true origin of the "tuber-like organs" has then been proved to be rudimentary leaves or the swollen bases of the normal ones.

Our plant shows then a very peculiar structure of rhizome, it being short, densely covered with tuber-like leaves, supporting and partly enclosing axillary buds, able to produce new individuals, and these are therefore very important in the propagation of the species. Three different kinds of leaves are present—tuber-like, scale-like and normal ones. The function of these thickened leaf-bases is undoubtedly the same as the fleshy scales of the monocotyledonous "leek" of *Lilium* for instance, containing large deposits of starch, besides that they by dropping from the rhizome are able to raise new individuals. In regard to the germination, this does not seem to be known, and it would be highly desirable to obtain some seeds so as to study the very first stage of this interesting species. If we might conclude something from the mature plant and reduce the figure of this to the germinating plantlet itself, might we then not suggest a germination with but one cotyledon, like in some species of the closely allied genus *Corydalis*, and that the base of this leaf-like cotyledon would show the same swollen form as that of a normal leaf, and partly enclosing the plumule?

Krigia Dandelion. There are a few interesting circumstances to be observed in the rhizome of this species, which do not seem to have been perfectly known before, and it may not, therefore, be superfluous to describe them a little more concisely. At least in the sixth edition of Gray's Manual of Botany the specific diagnosis does not give any clear explanation of the rhizome, but indicates merely the roots as being "slender and tuberiferous." "Tuberous" roots occur frequently in several families, but "tuberiferous" i. e. by tubers giving rise to new individuals, can not exist, if we will take the expression "tuber" in its proper sense. Roots, forming true bulbs, are on the contrary known and have been mentioned by Warming * as occurring in *Scilla Hughii.* It gave me, however, the impulse to examine the case myself, and the following note is the result of my examination. Several specimens were collected in the vicinity of Washington, where it grows abundantly in shady woods, and all my specimens showed the presence of several true tubers. These tubers, as it will be shown, do not belong, however, to the roots, but to subterranean stems. Plate CXIII, Fig. 25 shows then the complete rhizome and the leaves of a mature specimen; we see here that the plant has been developed from a large tuber, and that three stolons proceed from the leaf-bearing axis, all of which terminate in tubers.* The tuber has then been formed by the end of a stolon, a manner of propagation which is not uncommon, as for instance in *Cyperus esculentus* and others. The stolons are rather thin, with long internodes, of which the leaves are scale-like and pointed. The direction of the stolons is almost horizontal, and they do not run very deeply under the surface of the ground. The tubers themselves consist simply of but two internodes, the leaves of which are a little larger than those of the stolons, but show, however, the same form. In regard to the shape of the tubers, these are almost globular at a younger stage, but later they are of a nearly oblong shape with the apex acute, formed by a few pointed scale-like leaves. Now, when the tuber is going to germinate, the stolon dies away, and one or two relatively long internodes will be developed from the apex of the tuber, terminated by the flowering scape with a rosette of normal leaves. This is to be seen in Fig. 25, where the plant distinctly shows its offspring from a large tuber, and we see also one long vertical internode between the leafy rosette and the tuber itself. All the roots are confined to this internode, and it looks, certainly, as if it were a tuberiferous root. The stolons do not, however, always terminate in a tuber; in a case figured in Fig. 26, a small leafy rosette has been developed immediately at the end of a stolon, without being preceded by a tuber, and in this same specimen the stolon had been developed in the axil of a scale-like leaf, situated on the underground stem, formed by the large tuber. The plant propagates then easily by tubers and, as mentioned above, all the specimens collected showed only this kind of offspring. There is, however, no doubt that it is able to propagate by seeds also, but the germination has not yet been examined, and might probably show something interesting in regard to the primary root and the first beginning of the formation of stolons.

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* Eug. Warming: Smaa biologiske og morphologiske Bidrag. Botanisk Tidsskrift, Vol. II, Series III, 1877–'79, pag. 61.

[*There was a tuber represented in Mr. Holm's drawing on the stolon shown to the left of the figure, but it was accidentally omitted in the engraving.—Ed.]

As regards the interior structure of our plant, it is to be remarked that no mechanical tissue was observable, neither in the stolons, the rosette-bearing stem, nor, of course, in the tubers. The tuber contained inulin, forming great sphæro-crystals after being preserved in alcohol, and these occurred principally in the bark. A pith was found in the young tubers, which were perfectly solid, while the older ones were hollow on account of the partial disappearance of the pith. Cork was rather strongly developed in the older tubers, but otherwise there was nothing remarkable to be observed in the interior structure.

EXPLANATION OF PLATES.

Plate.CXI.

Fig. 1. The rhizome of *Uvularia perfoliata*, seen from before, showing the base of the two stolons, S, and four roots, natural size.

Fig. 2. A later stage of the same, showing the bud, B, which in the following year will develop a flowering stem. 3 × natural size.

Fig. 3. The end of one of the stolons of *Uvularia* with the beginning development of a root by R.

Fig. 4. The rhizome of *Oakesia sessilifolia*, seen from above. $\mathrm{Br.}^1$ and $\mathrm{Br.}^2$ are branches. St., the base of the flowering stem from this year, surrounded by two scale-like leaves. R., the roots, two-thirds natural size.

Fig. 5. Transverse section of the inferior face of the leaf of *Uvularia*. Ep., epidermis with a stoma. $\frac{\mathrm{I}}{\mathrm{VI}}$

Plate CXII.

Fig. 6. Transverse section of the inferior face of the leaf of *Oakesia*. Ep., epidermis with a stoma. $\frac{\mathrm{I}}{\mathrm{VI}}$

Fig. 7. Transverse section of the interior part of the root of *Uvularia*. B., the bark. End., the endodermis. Pr., the pericambium. Ph., the phloëm. X., the xylem. $\frac{\mathrm{I}}{\mathrm{V}}$

Fig. 8. Transverse section of the interior part of the root of *Oakesia*. The letters as above. $\frac{\mathrm{I}}{\mathrm{V}}$

Fig. 9. Transverse section of the median fibro-vascular bundle in the leaf of *Uvularia*. M., mesophyll. Ph., phloëm. X., xylem. $\frac{\mathrm{I}}{\mathrm{V}}$

Fig. 10. Transverse section of the median fibro-vascular bundle in the leaf of *Oakesia*. The letters as above. $\frac{\mathrm{I}}{\mathrm{V}}$

Fig. 11. Epidermis and the collenchymatous tissue of the median part of the inferior face of the leaf of *Oakesia*. $\frac{\mathrm{I}}{\mathrm{VI}}$

Fig. 12. Epidermis of the root of *Uvularia*, transverse section. $\frac{\mathrm{I}}{\mathrm{V}}$

Fig. 13. Epidermis of the rhizome of *Oakesia*, transverse section, showing the wrinkled cuticule. $\frac{\mathrm{I}}{\mathrm{VI}}$

$\frac{\mathrm{I}}{\mathrm{VI}}$ indicates Ocular I, Objective VI.

Plate CXIII.

Fig 14. The rhizome with the leaves and an inflorescence of *Diclytra Cucullaria* Natural size.

Fig. 15. Part of the same, showing the petioles of two normal leaves (L), and the base of the inflorescence, (I). The scale-like leaves have been removed, and in their axils are clusters of small tuber-shaped leaves to be seen.

Fig. 16. One of these clusters from the axil of a scale-like leaf.

Fig. 17. A tuber-shaped leaf, showing the small rudimentary toothed blade.

Fig. 18. A small specimen, developed from a tuber-shaped leaf, showing the tuberous base of a leaf, of which the petiole has faded, and a short axis, carrying a root, one scale-like and one normal leaf. 3 × natural size.

Fig. 19. A similar plant with three scale-like leaves, surrounding the normal one. 3 × natural size.

Fig. 20. A similar plant, of which the scale-like leaves have dropped, and where the base of the normal leaf shows the tuberous swelling. 3 × natural size.

Fig 21. The base of a normal leaf, in the axil of which clusters of small tuber-like leaves are to be seen.

Fig. 22. Part of the rhizome of a specimen collected in August, showing a bud surrounded by tuber-like leaves.

Fig. 23. One of these tuber-like leaves at the same time, showing the cavity at the base, in which a bud is to be seen.

Fig. 24. The axillary bud, taken out from the cavity, showing two very young leaves.

Fig. 25. A mature specimen of *Krigia Dandelion*, showing the leafy rosette and the rhizome, natural size.

Fig. 26. The rhizome of another specimen, where a stolon has developed a leafy rosette, not being preceded by any tuber, as in Fig. 25. Natural Size.

U. S. National Museum, Washington, D. C. Aug. 1890.

Recent Contributions to the Literature of the Diatomaceæ.

La Structure de la Valve des Diatomees. Dr. Henri Van Heurck. (Annales de la Societé Belge de Microscopie. xiii. 1890).

By the aid of Zeiss's new apochromatic one-tenth inch objective of 1.63 N. A., using monochromatic sunlight, compensating eye-piece and condenser 1.6 N. A., Dr. Van Heurck has produced a series of photographs which go far towards clearing up our ideas of the structure of the diatom valve. From his researches he derives the following conclusions:

1. Diatom valves consist of two membranes or thin films, and of an intermediate layer, the latter being pierced with openings. The outer membrane is very delicate. It is supposed that these membranes are sufficiently permeable to allow circulation by endosmose, though they have no real openings during the life of the diatom.

2. When the openings of the interior portion are arranged in alternate rows, they assume the hexagonal form; when in straight rows, then the openings are square or oblong.

Three phototype plates accompany the article. A very interesting feature is the resolution of *Amphipleura pellucida* into beads. The photograph of *Pleurosigma angulatum* shows that the opinion of the old microscopists was well-founded, and that the alveoles are really hexagonal. Dr. Van Heurck considers that the intermediate beads are produced by bad focusing of the alveoles.

Diatoms—Their Nutrition and Locomotion. J. D. Cox. (The Microscope, x, No. 7).

Ex-Governor Cox has long been a faithful student of the structure and life-history of diatoms, and has contributed several valuable papers upon the subject. In this paper he advances the following ideas:

1. It is not necessary to regard the raphe as a part of the mechanism of nutrition, as the life-sustaining osmotic process goes on through the alveoles, whose imperfectly silicified tissues at top and bottom permit the process of nutrition to go on freely.

2. The raphe is distinctively a part of the locomotive contrivance of diatoms, and it is probably the seat of a line of cilia working in a groove which is a true cleft.

Diatomees fossiles du Japon. J. Brun et J. Tempère. (Mémoires de la Societé de Physique et d'Histoire Naturelle de Geneve. xxx. No. 9).

This is an excellent monograph upon the fossil diatoms found in the cementstein of Sendai and Yedo, Japan.

Accompanying the seventy-four pages of text there are nine phototype plates containing 135 figures.

It is an interesting fact that three of the new species figured in the volume, viz.: *Tabulina Testudo*, *Brunia Japonica* and *Pleurosigma Hungaricum* are also found in the recently discovered fossil deposit at Atlantic City, N. J.

A Revision of the Genus Aulacodiscus, Ehrenberg. John Rattery, M.A., B.Sc., F.R.S.E. Journal of the Royal Microscopical Society, June, 1888.

A Revision of the Genus Auliscus, Ehrenberg, and of some allied

Genera. Same author. Journal of the Royal Microscopical Society, December, 1888.

A Revision of the Genus Actinocyclus, Ehrenberg. Same author. Journal of the Quekett Microscopical Club, July, 1890.

A Revision of the Genus Coscinodiscus, Ehrenberg, and of some allied Genera. Same author. Proceedings of the Royal Society of Edinburgh, Vol. xvi.

Mr. Rattery is entitled to the everlasting gratitude of diatomists for his extended labors in endeavoring to reduce to a system the classification of the many species included in the genera named. The artificial key appended to each will be found of especial value in tracing species. Most diatomists, however, will probably regret that the author did not do more in the way of condensing the number of species.

Le Diatomiste. J. Tempère. Paris.

This is a quarterly journal devoted to the Diatomaceæ. Three numbers have already appeared. Each number is accompanied by two phototype plates. As Prof. Tempère is assisted by such well-known authorities as Messrs. Brun, Cleve, Grove and Peragallo, it is likely that the character of the journal will be well sustained.

In the number for June, 1890, M. Peragallo gives a tabular list of species of *Coscinodiscus* as given by Schmidt, Van Heurck and Castracane, and in parallel columns the synonyms according to Rattery. This table is of especial value, and will save the student much research. C. H. KAIN.

Salvinia natans (L.) All., in Minnesota.

This very interesting heterosporous pteridophyte is apparently rare in North America. It is reported in the fifth edition of Gray's Manual as probably not occurring in North America, although Pursh is supposed to have found it in Western New York. In the sixth edition this uncertainty is somewhat dispelled by a report of the plant from Missouri, but no authority is given for the station. It is, therefore, an important discovery which this note chronicles, viz., that *Salvinia natans* (L.) All., grows in Sweeney's Twin Lake, four miles west of the city of Minneapolis. Only a few plants have been found and these have been transferred to a tank in the university plant-house, where they are growing vigorously, and it is hoped will have soon multiplied enough to admit of a distribution. These *Salvinias* were collected early in October, but were overlooked in the first examination of material. Not until they had separated from the mass of *Lemnas, Myriophyllums* and *Potamogetons* with which they were gathered were they noted. Six good-sized plants are at present growing in the tank, double the number that first appeared. The leaves are a trifle smaller than indicated in the figure in Luerssen's *Farnpflanzen*, Vol. III of Rabenhorst's *Kryptogamen Flora*, page 601, otherwise the plants are strictly typical. The lake from which they were collected is in a boggy tract surrounded with trees of *Larix* and hard-wood timber. It is fed from cold springs and rains. Perhaps the smaller size of leaves in Minnesota specimens is due, however, not to the cold lake, but to the time of collection being so late.

CONWAY MACMILLAN.

University of Minnesota.

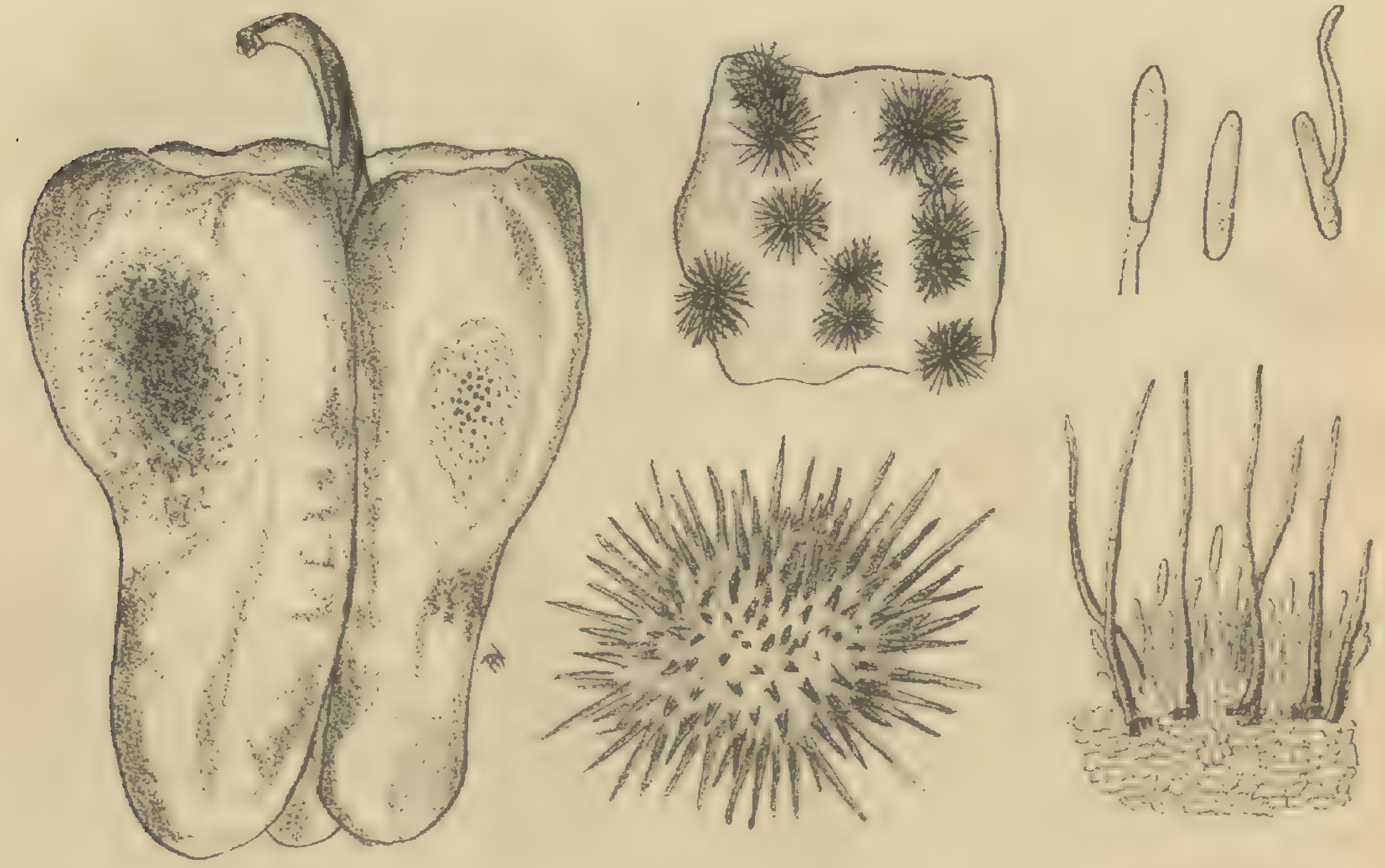
A New Anthracnose of Peppers.

While in Gloucester Co., N. J., during August I observed that the pepper (*Capsicum annuum*) fruit was decaying badly. The pepper is usually attacked near the free end and quickly the fungus spreads in all directions, internally as well as through the thick walls of the fruit. At first the spot is of a grayish color upon the green surface of the half grown fruit, followed by a darkening of the affected portion and often a premature red coloration in the vicinity of the decay. Peppers are grown in large quantities for the Philadelphia and other markets, and in some of the fields the yield is materially reduced by this trouble. Upon some plants the disease is much worse than others and with such sometimes a half dozen fruits may be found in decay.

Upon a microscopic examination of this fungus it was found to be a member of the genus *Colletotrichum* but differing materially from any other in having a great number of large, almost jet black bristles. The following is a description of the bristly anthracnose of the pepper.

Colletotrichum nigrum, Ell. and Hals.—Spots one to two centimeters across, orbicular; central portion black from the abundance of black bristles, margin paler. Acervuli numerous, crowded, erumpent, margined by a circle of long, 100-150μ by 3-4μ black straight bristles. Basidia olivaceous, slender, 15-20μ long. Conidia cylindrical, nearly straight, hyaline, nucleate 20-22μ by 4μ.

In the engraving, upon the left is shown a pepper with the decaying patches, the larger and darker being the older. In the upper center of the engraving is seen a magnified view of a portion of the dark diseased spot with the fungus shown as rosettes, one of the latter being given more highly magnified below. A section through the same is indicated in the lower right hand corner and the spores are shown just above and greatly magnified.



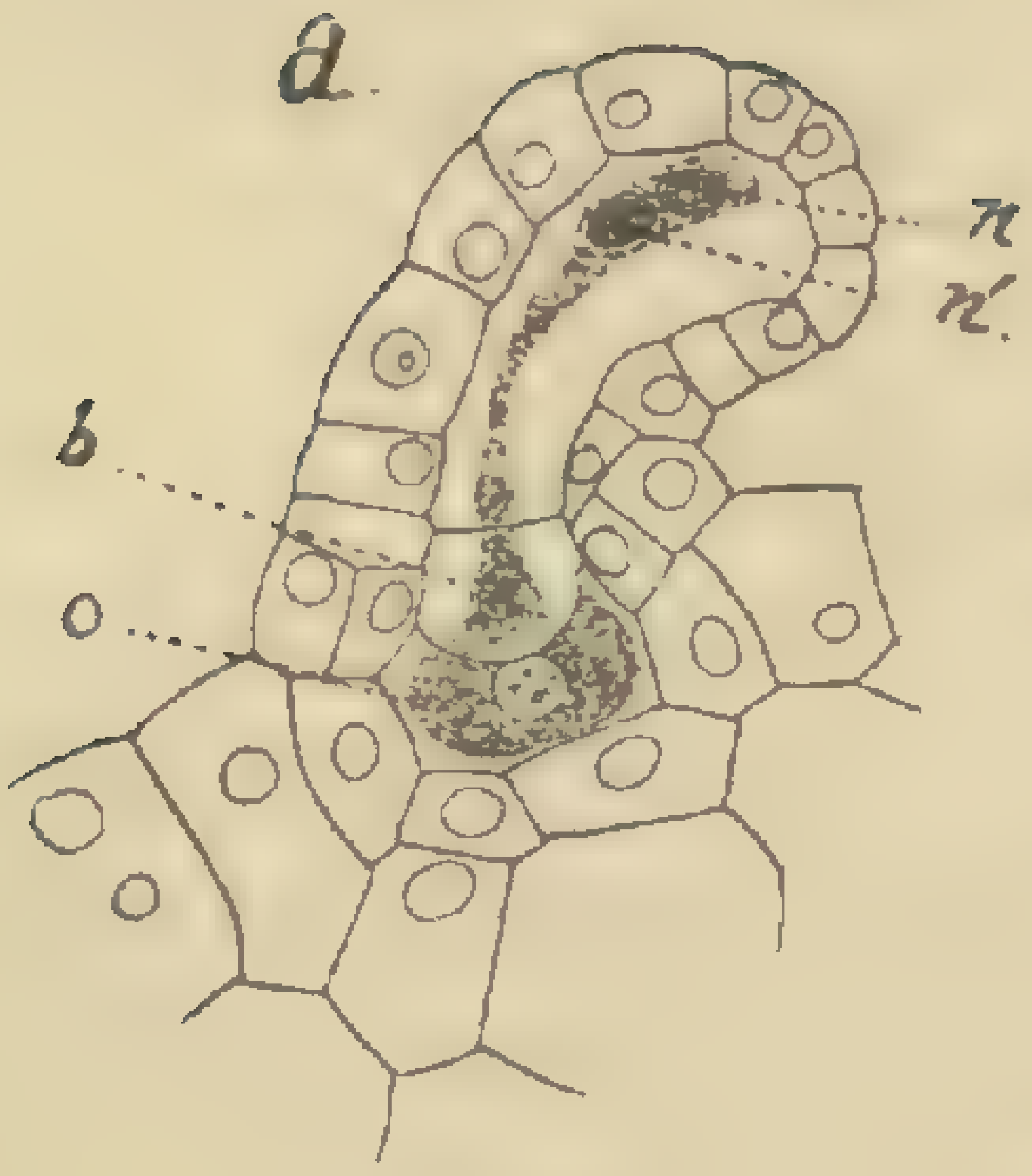
This black *Colletotrichum* must be called the Bristly or Black Anthracnose of the pepper because another anthracnose, namely: *Gleosporium piperatum*, E. & E., has been found during the present season upon the same pungent fruit.

Byron D. Halsted.

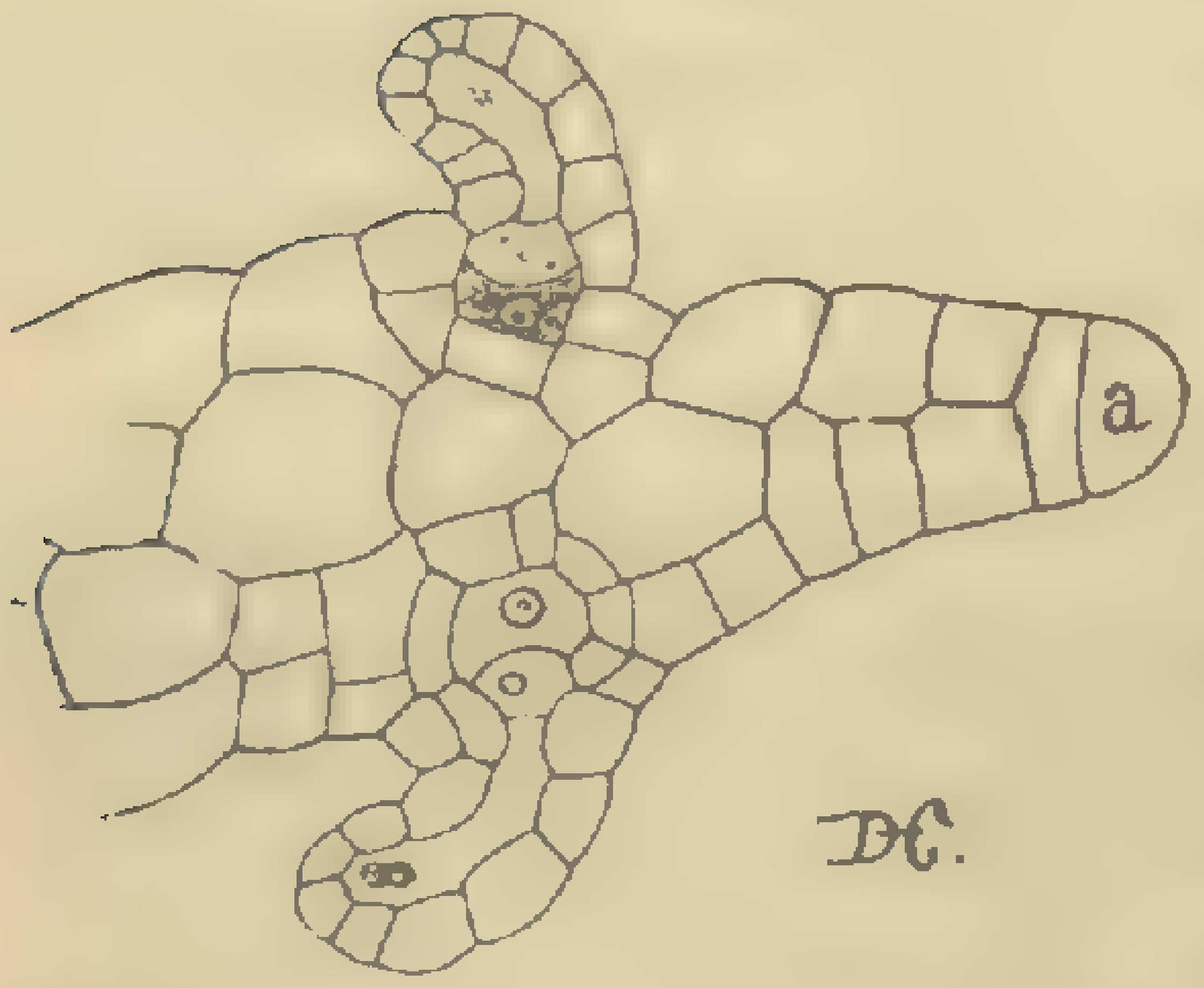
Rutgers College, Sept. 11, 1890.

Notes on the Archegonium of Ferns.

a.



b.



1. In a memoir on the Ostrich Fern*, published some time since, the statement was made that the ventral canal-cell was wanting. This decision was based on numerous sections of the living prothallium, and has since been found to be incorrect. In microtome sections, (see fig. a.) the ventral canal-cell (b.) is very evident, and is plainly derived from the central cell. In the upper canal-cell, two nuclei may usually be readily seen, but in no cases observed was the cell divided.

2. On sectioning one prothallium, perfectly developed archegonia were noticed both above and below (Fig. b.) and subsequent examination showed numerous other instances of the same thing; in several of these prothallia, embryos developed from archegonia upon the upper surface. Is this a case of reversion to an ancestral form having archegonia above as in liver-worts? Unfortunately the fern from which these came could not be determined.

DOUGLAS H. CAMPBELL.

Bloomington, Indiana, October, 1890.

EXPLANATION OF FIGURE.

a.—Vertical section of the full-grown archegonium of *Onoclea Struthiopteris.*
o.—Central cell of the archegonium.
b.—Ventral canal-wall.
n-n^1—The two nuclei of the upper canal-cell.
b,—Vertical, longitudinal section of a fern-prothallium sp. (?) with archegonia upon both surfaces.
a.—One of the apical cells.

Virginia Creeper.

Many years ago the late Dr. Warder called my attention to the two supposed forms of *Ampelopsis* (see BULLETIN xvii. 269) in

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*The Development of the Ostrich Fern, D. H. Campbell, Memoirs, Boston Society of Natural History, 1887.

Ohio, where he occasionally took me to see some illustration of the non-attachable forms. I could see nothing but a mere condition. Plants that would not cling, as it was said, at Dayton, Ohio, clung well enough for me after I brought them here. At Cleveland I was taken by some friends to see a kind that was said not to cling, and the grape-vine-like tendrils it was producing, freely commented on. But I pointed out a branch that had found out an old post for a friend, which was climbing by disk-attachment. There is about the same relation between these two forms as between *Rhus radicans* and *Rhus Toxicodendron*, when there is something it likes to attach itself to, it suits its habits to the fact,—and does not when the circumstances are repugnant. We might with as much reason say there are three forms of *Ampelopsis*,—for when it finds a dead tree to run on, it throws out a mass of annual rootlets along the stem, precisely as *Rhus radicans* does. It would probably do so under other conditions, though I only remember the rootlets on these rotten trees. That there are variations worth noting as distinct varieties, I have long thought probable. The Horse-chestnut-like foliage common to the *Ampelopsis* as we see it along the great lakes, impresses one at a glance as being distinct from the narrower, and less regularly toothed forms further south.

THOMAS MEEHAN.

Botanical Notes.

Hooker's Icones Plantarum, the third series, now being published by means of a legacy left for the purpose by Mr. Bentham, are to be edited hereafter by Professor Daniel Oliver. Vol. xi. is devoted to Indian orchids, Vol. x. being in course of publication at the same time. Only 250 copies are printed, and it would be well for American libraries to secure the work before the edition is exhausted, after which this valuable serial will be difficult to obtain. The subscription price is very low, considering the expense of drawing and engraving, 100 plates of new or rare plants being produced annually.

Reviews of Foreign Literature.

Monographia Juncacearum. Franz Buchenau. Engler's Bot. Jahrb., XII 1-495, (mit Tafel I-III und 9 Holzschnitten). 1890.

Pages 1 to 5 contain a description of the order, references to the principal literature, and an analytical key to the nine genera.

Pages 1 to 60 make up a comparative account of the Juncaceæ, each organ and each relationship being discussed in detail. Especially noteworthy among these observations are those on vicarious species and genealogical relationship. A list of twenty pairs or groups of species is given, in which the members of each group are closely related, but have separate, often widely separate geographical range. *Marsippospermum*, *Rostkovia*, and the several sub-genera of *Luzula* and *Juncus* have been derived, it is believed, from a type form similar to the "Junci poiophylli," of which *J. bufonius* and *J. tenuis* are examples. It is to be noted that the genera *Marsippospermum* and *Rostkovia* are represented as branching from subgenera of *Juncus*. The author, therefore, does not consider that groups of species, in order to be entitled to separate generic rank, must possess co-ordinate differentiation; but that one existing genus may have been derived from a form belonging to another existing genus.

Pages 60 to 463 contain the systematic part proper of the monograph. Of the nine genera, *Distichia*, *Patosia* and *Oxychloë*, are confined to the mountains of South America; *Marsippospermum* and *Rostkovia* to New Zealand, southern South America and the adjacent islands; *Prionium* to the Cape of Good Hope; *Luzula* and *Juncus* are widely distributed, and *Thurnia*, doubtfully classed with the Juncaceæ, is found only in British Guiana.

The number of species in each genus is as follows:

	Total.	North American, north of Mexico.	Mexican, additional.
Distichia,	3	0	0
Patosia,	1	0	0
Oxychloë,	1	0	0
Marsippospermum,	2	0	0
Rostkovia,	1	0	0
Prionium,	1	0	0
Luzula,	51	8 (besides *L. Carolinæ*)	3
Juncus,	176	65	3
Thurnia,	2	0	0

Of these species of *Luzula*, two are new to North America, *L. glabrata*, Desv. (Rocky Mountains, Lyall, Howell), and *L. confusa*, Lindenberg,(White Mountains, etc.) This White Mountain plant has been called *L. arcuata*, but that is found only farther north. *L. divaricata*, Watson, is referred to *L. parviflora*, Desv., and *L. spadicea* of American authors and its varieties become *L. parviflora*, Desv., the true *L. spadicea*, DC., not being credited to America. *L. Carolinæ*, Watson, is quoted with the original description and the note "Planta mihi ignota, caruncula deficiente a *L. pilosâ* valde diversa videtur" added, but the species is not numbered with the rest.

The greater part of the monograph, pp. 167–463, is devoted to *Juncus*. The genus is separated into eight sub-generic groups: Subulati, Poiophylli, Genuini, Thalassici, Septati, Alpini, Singulares, Graminifolii, of which all but two, Subulati and Singulares, are represented in North America. The group Ensifolii of Engelmann is included in the Septati.

The new species and the changes of specific names from the current American nomenclature are condensed into the following table. The species, as recognized by Buchenau, are printed in Roman type, the synonyms in italics.

Juncus Mexicanus, Willdenow = *J. compressus*, H.B.K.
" acutus sphaerocarpus, Engelmann = *J. robustus*, Watson.
" brachycephalus Buchenau, n. sp. = *J. Canadensis brachycephalus*, Engelm.
" trigonocarpus, Steudel = *J. caudatus*, Chapman.
" ensifolius, Wikström = *J. xiphioides triandrus*, Engelm. in part.
" Engelmanni, Buchenau = *J. scirpoides polycephalus*, " " "
" crassifolius, Buchenau, n. sp. = " " " " "
" dubius, Engelmann = " *J. rugulosus*, Engelmann.
" paucicapitatus, Buchenau, n. sp. = a Sitkan plant collected by Mertens.
" lamprocarpus, Ehrhart, = *J. articulatus*, L.
" Regelii, Buchenau, n. sp. = Suksdorf, No. 678, (1885); M. E. Jones, *J. longistylis latifolius*, without number and No. 1199, (Utah).
" latifolius, Buchenau, n. sp. = *J. longistylis latifolius*, Engelm.

In addition several changes in the disposition of varieties and their names are made, and a few of the species are arranged so as to show relationships different from those indicated by Engelmann. In only one case (that of *Juncus rugulosus*) has one of

Engelmann's species been referred to a species previously described. *Juncus Breweri*, Engelmann, is, however, considered doubtfully distinct from *J. Leseurii.*

At the end of the monograph, pp. 468 to 487, is given in tabular form the names as recognized by the author, of all the Junci exsicatti to be found in accessible herbaria.

The nomenclature adopted by the author varies somewhat from that followed by the leading botanists and other naturalists in this country. For example, if a species includes two or more forms, Buchenau usually gives to the form that was the type a varietal name, commonly var. *genuinus*. The custom followed by Gray, and now by almost all naturalists, is to allow the name of the species to stand for the form originally described, and to add varietal names only to forms subsequently described.

Juncus leptocaulis, Torrey and Gray, still retained by Buchenau, should be *J. filipendulus*, as pointed out by Britton.

Another point in nomenclature at variance with American custom is illustrated by the total loss of the Linnæan name *Juncus articulatus*. The species as originally described has been separated into two; and instead of adopting the Linnæan name for one of them, two later names are taken up.

As a whole, the work forms a very valuable working basis to the study of North American Juncaceæ, as it is the best present summary of our general knowledge of the group.

F. V. COVILLE.

Histology and Physiology of the Characeæ.—The "Botanisches Centralblatt," Vol. 44, Nos. 1 and 2, contains an article with the above title, written by Dr. Overton in the University of Zürich. The work is only fragmentary, being parts of results of experiments not yet finished. It was begun with the aim to discover the nature and function of the peculiar little bodies known in German as wimperkœrperchen, ciliated bodies, which float about with the rotating protoplasm; also with the hope that by following closely the processes concerned in the development of the spores, some light might be thrown on the relationship of this group to others, and some points obtained regarding the morphological signification of the central canal cell of the Archegoniata.

In regard to this hope the author says the obstacles to overcome were greater than he had supposed, and that so far, he has been able to ascertain very little with definite certainty. After giving the method of studying the fertilization of the egg and explaining the difficulties in the way of following the successive steps of development, he says that the commonly received opinion that the outer membrane of the spore, on ripening, becomes lignified is entirely without support. His experiments proved conclusively that this membrane is cuticularized or suberized, but never lignified. In describing the markings of the shell of these spores, he says it is quite possible to decide the various species by the difference of these markings.

In regard to the wimperkœrperchen the results were more satisfactory. Even here no conclusion as to their function was reached. The plant which served as material for this part of the work was *Nitella syncarpa* and was taken from the Zürich lake. These bodies were found in cells of nearly all parts of the plant but especially in the long internodal cells of the main portion. They were found to consist of albuminous matter and tannin. Other bodies occurring in the same cells are described as having the appearance of clear bubbles, some of which are as large as the ciliated bodies. Both of these structures, he says, have been mistaken for the cell nucleus, and states that much uncertainty in reference to their origin, nature and function has hitherto existed. He claims that they are in no way related to the cell nucleus, but that the so-called bubbles have the same chemical composition as that of the ciliated bodies, and that probably the latter are merely developed stages of the former. As proof of this he mentions that transition stages of various kinds were seen, and adds, that as the ciliated bodies were not found in the act of division, it is quite probable that they multiply only while in the form of bubbles, afterwards developing into the full-fledged body.

In regard to their behavior towards reagents and coloring matters, they are not unlike the protein grains found in Ricinus seeds. The fact that they are found in very young cells, where chlorophyll grains have only just made their appearance, being few in number and only slightly colored, suggests the possibility of their connection with the process of assimilation. On the other hand, as they occur so frequently and in such great numbers in old cells which are in the process of dissolution, the inference here is that they play no part in the nutritive processes of the plant. It is somewhat singular that while they were found in such abundance in the *Nitella* plants, in all the different species of *Chara* used in the course of these experiments no wimper kœrperchen were seen.

E. L. G.

Statistics of the Fertilization of Flowers.—In the "Verhandlungen des Botanischen Vereins der Provinz Bradenburgh" xxxi, 1-63, is an article by E. Loew on "Blütenbiologischen Statistik." In this he gives the results of his investigations, in which he followed the method of Herman Müller in his work on the fertilization of flowers by insects.

This method was that of actually counting the visits of insects to flowers, made in such a manner as to secure the fertilization of one flower by the pollen from another. Müller records 10,000 instances of this kind counted by himself, and by a comparison of Alpine flowers and insects with those of north and middle Germany he reached the following conclusion; that the ancestors of certain Alpine flowers, such as *Viola calcarata*, *Rhinanthus alpinus*, &c., &c., must have emigrated from Germany into the Alpine regions as bee or humming bird flowers; that is, flowers adapted to fertilization by means of bees or humming birds, and these gradually changed their morphology so as to become butterfly flowers, owing to the much greater number of butterflies in that region than of bees or humming birds.

Loew says of this conclusion, that in the minds of certain biologists, Müller's keenness of reasoning has caused a distrust of his method of work, therefore it seemed to him important to repeat the work of Müller under circumstances differing as widely as possible from those surrounding the plants studied by the latter. This he did by using the same method on plants growing in the botanical garden in Berlin, for a series of years. In this manner the conduct of insects, similar to those of Westphalia and Thuringen, could be observed in regard to flowers of all possible origin. The author, after giving several tables showing the number of visits as actually counted, says the results confirm the conclusions reached by Müller. He follows these statements by similar tables made during a series of years in different localities; he also gives the results obtained by McLeod in Ghent and by Lindmann in other northern regions.

As all of these results point in the same direction, except in certain instances which admit of a reasonable explanation, he says the mutual dependence of these plants and animals can best be expressed as follows: Those insects and flowers which theoretically may be considered as influencing each other in respect to their mutual adaptation to this method of fertilization are those which in reality do influence each other the most strongly.

This expression, he says, is the same as that stated by Müller, though in somewhat different terms, and adds, that it has not yet been confirmed by actual statistics, but when this has been done a very important biological law will have been discovered, and one which will serve to make clear other points now in obscurity. His work in the botanical garden of Berlin was undertaken to prove that Müller's general methods were trustworthy, but he prefers another method of classification of flowers and flower-fertilizing insects, and for this reason he purposely selected a limited territory for his field of observation, as in this way the worth of his classification would best be made evident.

In order to see how his particular method applied to larger stretches of country, other observations were made at different intervals, in various localities and the results arranged in a similar manner; finally he states that the comparison of all the observations so far made, lead to the probability of the truth of Müller's conclusion, and that further work in this same manner is necessary to establish this conclusion as a fact.

E. L. G.

Note sur un Nouveau Parasite dangereux de la Vigne. (*Uredo Vialæ, sp. nov*). M. de Lagerheim, Professeur a l'Université de Quito (Equateur). Rev. Gen. de Bot. 15 Sept., 1890.

Uredo Vialæ, a new fungus destructive to Grape Vines, was found on the leaves of a Vitis near a country house between Kingston and Rockfort on the Island of Jamaica and is named in honor of M. Pierre Viala of the National School of Agriculture at Montpellier.

It must not be confused with *Uredo Vitis*, Thümen, which latter, according to M. Viala, is neither an Uredo nor even a fungus. The specimens distributed under that name among the exsiccatæ of Von Thümen are identical with the original specimens of Ravenel in the herbarium at Philadelphia and in that of Curtis at Cambridge. The cause of the error "is an affection common enough on vines planted on the sands of the sea shore and is a of physiological and accidental nature. The cells of the epidermis undergoing a change are isolated by desiccation, and, on account of their reddish color, might easily in a superficial examination be taken for the spores of an *Uredo*."

Uredo Vialæ is therefore the first of the Uredineæ known on a Vitis with any degree of certainty.

Von Thümen reports no less than 323 species of fungus parasitical on *Vitis vinifera* alone and as many of the most destructive of them in Europe have come from America, this note on the subject is a warning to agriculturists to be on the lookout for another enemy.

A second new species of Uredo very closely resembling *U. Vialæ* was found by M. de Lagerheim in the neighborhood of Quito on the leaves of *Cissus rhombifolia*, Vahl? and is described provisionally under the name of *Uredo Cissi*.

A. M. V.

British Moss Flora, II. Part XIII. R. Braithwaite. (London, Aug. 1890, pp. 105–144; t. LXI–LXVI.)

This fine work continues to improve in the illustrations, which in this part are excellent. Of the species figured there are 17 American as follows: *Splachnum ampullaceum*, L., *S. vasculosum*, L., *Tetraplodon bryoides*, (Zoega) Lindb. (*T. mnioides*, Br. Sch.); *T. angustatus*, (Sw.) Br. Sch., *Tayloria lingulata*, (Dicks.) Lindb. (*Dissodon splachnoides*, Grev.); *Discelium nudum*, (Dicks.) Brid., *Amblyodon dealbatus*, (Dicks.) P. Beauv., *Nanomitrium tenerum*, (Bruch) Lindb., *Physcomitrella patens*, (Hedw.) Br. Sch., *Physcomitrium pyriforme*, (L.) Brid., *Funaria attenuata*, (Dicks.) Lindb., (*Entosthodon Templetoni*, Schwaegr.); *Funaria calcarea*, Wahlenb. including *F. Mediterranea*, Lindb., *F. microstoma*, Br. Sch., *F. hygrometrica*, (L.) Sibth., *Oreas Mielichhoferi*, (Funck) Brid. (*Mielichhoferia nitida*, Hornsch.); *Leptobryum pyriforme*, (L.) Wils. and *Pohlia acuminata*, Hornsch. (*Webera acuminata*, Schimp). We commend this work to students of American mosses, for its conscientious historical research and concise descriptions. E. G. B.

Monographie der Gattung Stylosanthes. P. Taubert. (Verhand. Bot. Ver. Brandenburg, xxxii. Reprinted).

This is the first time since the publication of De Candolle's Prodromus Vol. ii, in 1825, that the species of this Leguminous genus have been treated of collectively. Herr Taubert now recognizes 22. Of these two are North American: *T. biflora* (L.) B. S. P. (*S. elatior*, Sw.; *Trifolium biflorum*, L.) the binomial attributed by the author to himself, probably not being informed of the fact that it was used in 1888 by the authors of the Preliminary Catalogue of Plants growing within one hundred miles of New York, and *S. hamata* (L.), Taub. (*S. procumbens*, Sw.; *Hedysarum hamatum*, L.), the latter a common West Indian plant, occurring also in Florida and including, according to him, Curtis No. 609 from Tennessee. *S. Schaffneri* from Mexico, *S. sympodialis* from Ecuador and *S. Pohliana* from Brazil are described as new. Of the 22 species, only five occur in the Old World. Herr Taubert, it will be noticed, maintains the earliest specific names. N. L. B.

Index to Recent Literature on North American Botany.

Abies Fraseri. (Gard. Chron. viii. 684, 685, fig. 132).

Abrus præcatorius.—Ueber. Prof. Kobert. (Sitzungsb. Naturf. Gesell. Dorpat, ix. 114–117).

Araucaria imbricata. (Gard. Chron. viii. 587, 588, figs. 117, 118 also full page illustration).

Aristolochia grandiflora. (Gard. & For. iii. 596, figs. 78-80).

This remarkable plant, native of the West Indies and tropical America generally, has recently flowered at the nursery of Mr. E. D. Sturtevant, at Bordentown, N. J. The flowers are among the largest of any known, one reaching the extraordinary dimensions of twelve by eighteen inches, with forty-two inches of tail, or a total length of five feet.

Bilbergia thyrsoidea, Mart. L. Wittmack. (Gartenflora, xxxviii. t. 1291).

Native of Brazil.

Biographical Sketch of J. B. Ellis. F. W. Anderson. (Bot. Gaz. xv. 299-304, with portrait).

California White Oak—The. (Garden & Forest, iii. 606, illustrated).

Description and picture of *Quercus lobata.*

Carica Papaya—Frucht in Frucht von. Fritz Muller. (Flora, 1890, 332-333).

Caryocar Brasiliense. Eug. Warming. (Vidensk. Meddel. Naturhis. For. Kjobenhavn, 1890, 45-48 ; one plate).

Cascara Sagrada and its Allies. H. H. Rusby. (Druggists' Bull., Oct., 1890, ten figures. Reprint, pp. 8).

This is a discussion of the West American species of *Rhamnus.* The drug bearing the above name is derived from the bark of *R. Purshiana.* Dr. Rusby maintains that it is clearly distinct from *R. Californica*, which it most nearly resembles, and that *R. tomentella*, Benth., *R. occidentalis*, Howell, and *R. rubra*, Greene, are also probably distinct.

Cattleya Schilleriana, Reichenb. F. E. Ortgies. (Gartenflora, xxxviii. 33, t. 1290).

Native of Brazil.

Contributions to the Life-histories of Plants. V. Thomas Meehan. (Proc. Acad. Nat. Sci. Phila., 1890, 266-277. Reprinted).

This number of Mr. Meehan's interesting series contains notes "On the anthers of *Lappa major ;* "The Pollination of *Crucianella stylosa* ;" "On Unisexuality in connection with the Order of Flowering in Willows ;" "On the Varying Character of Dichogamy in Flowers of *Corylus Avellana* ;" "Diœcism in Labiatæ ;" "Self-fertilizing Flowers ;" "On the Male and Hermaphrodite Flowers of *Æsculus parviflora*" and "On the Direction of the Spiral Twist in the leaves of the Norway spruce."

Eucharis Lehmanni, Regel. E. Regel. (Gartenflora, xxxviii. t. 1300).

A new Amaryllid from Columbia.

Euonymus obovatus, Nutt. H. Zabel. (Gartenflora, xxxviii. 638-640).

A discussion of this species, maintaining it to be distinct from *E. Americanus.*

Field Notes from the Colorado Desert. C. R. Orcutt. (Garden & Forest, iii. 558, 559).

Formation of Travertine and Silicious Sinter by the Vegetation of Hot Springs. Walter H. Weed. (U. S. Geol. Surv., Ninth Ann. Rep., 619-676, illustrated. Also reprinted).

The author begins by calling attention to the fact that the influence of plant life in building up certain formations is frequently ignored, for the reason that it is only by a careful study of such formations while in actual process of construction that an adequate idea of this influence can be gained. It is no doubt for this reason that the subject has been heretofore neglected, and the author has taken full advantage of a comparatively unexplored field of investigation. The facts upon which this article is based were gathered in the Yellowstone region, but a general review of the literature of thermal spring vegetation precedes the author's own observations. This vegetation is entirely algal, and in the Yellowstone region, does not occur at a temperature above 185° Far. Although this vegetation has been frequently noted and studied to a greater or less extent, its importance in the formation of hot spring deposits does not seem to have received the attention which it deserves. Not only do the plants become encrusted with the mineral matter, but by their abstraction of carbonic acid from the water they hasten the deposition of the carbonate of lime and thus become an important factor in the formation of travertine. In fact, proof is given that in certain places travertine would not form but for the presence of plant life. In only two instances was it found that vegetation was not either directly or indirectly concerned in its formation. Of the numerous forms of travertine none show the vegetable origin more clearly than the fibrous tufa forming fan-like masses. If a fragment of this is dissolved in hydrochloric acid it shows that each of the fibres is formed of a single encrusted alga filament. In the formation of silicious sinter, the algæ seem to act mostly by forming dams or other obstructions of gelatinous material, over which the sinter is deposited. Thus pillars are formed in the interior of pools and rims around the margins. The exact manner in which the algæ eliminate the silica from solution does not seem to be known, but from what the author says, it is evident that he considers it due directly to the action of the plant's vitality in some way, and he says that both the filaments and their slimy coverings are formed of gelatinous silica. "In general, it may be stated that the large vase and pillar-forms found in the alga pools can be produced only by a concurrent life and death of these plants; the outer layers continually growing, the innermost dying." Besides the sinter formed from the jelly-like masses there are fibrous sinters formed by *Calothrix gypsophila* and *Leptothrix laminosa.* On the lower part of the slope, below the Madison Plateau, a moss (*Hypnum aduncum*, var. *gracilens*) seems to act as an agent in forming sinter, and we are told that "this sinter is not formed by evaporation * * * but is due to the abstraction of silica from the water by the mosses * *." The difference between the unaltered sinter, due to simple evaporation of the water and that due to the influence of vegetable life, is quite marked; the former being translucent or vitreous, while the latter is opaque and often chalk-like in appearance. Diatoms are abundant in the cooler waters and form the ooze of the geyser basin marshes. The author has certainly proved a far greater importance for plant life as a rock-building agent than we formerly knew of and it is quite possible that similar studies in other localities would yield equally interesting results.

A. H.

Gunnera.—Eine Brasilianische (*Gunnera manicata, Linden.*) W. Schwanke. (Engler's Bot. Jahrb. xii. Beiblatt nr. 28, 1-3, illustrated).

Hepaticæ Africanæ Novæ in Insulis Bourbon, Maurice et Madagascar lectæ. F. Stephani. (Bot. Gaz. xv. 281–292. Pl. XVII-XIX).

Twenty-three new species are described.

Hepaticæ—List of Canadian. W. H. Pearson. (Geol. and Nat. Hist. Surv. of Can. Montreal, 1890. Pamph. pp. 31, Pl. XII).

Professor Macoun is to be congratulated on having secured so competent and conservative a student as Mr. Pearson to work up his collections of Canadian liverworts, and we learn with pleasure that the only new species described, *Frullania Selwyn-*

iana, is dedicated to A. R. C. Selwyn, the Director of the Survey. Two of Austin's MSS. names are printed, and 165 species are enumerated. The plates are lithographed from drawings by the author, and notes by Dr. Spruce add interest to the list. A full index of names and synonyms, and a correct system of nomenclature, make this a memorable contribution to our knowledge of North American hepaticæ. E. G. B.

Hippeastrum reticulatum, Herb. L. Wittmack. (Gartenflora, xxxviii. t. 1297).

Native of southern Brazil.

Jamaica—Bulletin of the Botanical Department. December, 1890. Contains Part ii of the synoptical list of ferns and their allies, by G. S. Jenman.

Twenty-five species of the genus *Trichomanes* are enumerated.

Jamesia Americana, Torr. and Gray. H. Zabel. (Gartenflora, xxxviii. 103, 104; two figures).

Lakeside Daisy—The. Clarence M. Weed. (Journ. Columbus Hort. Soc. v. 72, 73, Pl. VI).

The discovery is reported from the Sandusky Peninsula, near Lakeside, Ohio, of *Actinella acaulis*, where it appears to be thoroughly established. This is certainly an interesting find and we should not now be surprised to hear of its discovery at other intermediate points between there and its ordinary habitat west of the Mississippi.

Leo Lesquereux.—Obituary Notice of. J. P. Lesley. (Proc. Amer. Philos. Soc. xxviii. 65–70).

Leucophyllum Texanum. (Garden & Forest, iii. 488, 489, fig. 63).

Lilium superbum. (Garden, xxviii, 506, 507; illustrated in text and with colored plate).

Liriodendron—Notes on the Leaves of. Theodor Holm. (Proc. U. S. Nat. Mus. xiii. 13-35; plates IV–IX; reprinted).

This paper consists of a detailed description of the leaves of the Tulip-tree, and a discussion of the relations of the several fossil (Cretaceous and Tertiary) species which have been described by Dr. Newberry (BULLETIN, xiv, 1—7), Lesquereux, Heer, and other authors. Reasoning from the well-known variability of the foliage of *L. Tulipifera*, many forms of which are illustrated on the accompanying plates, Mr. Holm is inclined to maintain that the three species described by Dr. Newberry from the Amboy clays are forms of a single one; this hypothesis, indeed, appears to be the main object of the paper.

Mr. Holm's work indicates much research. He has, however, made one mistake, and that we believe a most serious one. We refer to the fact that he has not seen the specimens on which Dr. Newberry's paper was based, but has written all these pages on the information to be derived from the single figures of the three species alluded to. Since that paper was written an immense amount of additional material has been derived from the Amboy clays, and enough of *Liriodendron* to support the species indicaten in the original descriptions. If Mr. Holm had taken the trouble to come to New York we could have shown him more in *Liriodendron* than he has hitherto had opportunity to inspect.

N L. B.

Lonicera oblongifolia, Hook. and L. villosa, Muhl. H. Zabel. (Gartenflora, xxxviii. 526, 527).

Mamillaria Grusoni and Echinocactus Bolansis. E. Runge. (Gartenflora, xxxviii. 105, 106; two figures).

Two new Cacti from Coahuila, Mexico.

Masdevallia Chimæra, Reichb. f. G. Sommer. (Gartenflora, t. 1311).

Native of New Grenada.

Notes from a Garden Herbarium.—II. L. H. Bailey.

This article treats of raspberries and blackberries. *Rubus villosus*, *R. villosus*, var. *frondosus*, *R. neglectus* and *R. occidentalis* are figured and described and two new varieties of *R. villosus* are also described, viz.: var. *albinus*, founded on the creamy white fruit, and var. *sativus* which has larger, more globular fruit than the species. This latter is stated to be the parent of nearly all the cultivated varieties of high blackberries.

Notes on Rare East Tennessee Lichens. W. W. Calkins. (Am. Nat. xxiv. 1078, 1079).

Notes on the Flora of the Lake Superior Region.—III. E. J. Hill. (Bot. Gaz., xv. 304–311).

In this contribution the botanical features in the vicinity of Vermillion Lake, Minnesota, are described. *Caltha natans* is noted from the neighborhood of Tower.

Notes Sur le genre Trentepohlia, Martius. M. Paul Hariot. (Jour de Bot. Paris, 1 Nov. 1889,—16 Mai. 1890).

The following species occur in the United States: *Trentepohlia aurea* (L.), Martius; *Trentepohlia abietina* (Flotow), Hansgirg; *Trentepohlia effusa*, (Krempelhüber,) Hariot (*T. setifera*, Farlow); *Trentepohlia odorata* (Wiggers), Wittrock; *Trentepohlia rigidula* Müll. Arg.) Hariot. (*T. tortulosa*, Willdeman), might occur in the Southern United States.

Otacanthus, Lindl. und Irhe Verhältnis zu Tetraplacus, Radlk.—Die Gattung. P. Taubert. (Engler's Bot. Jahrb. xii. Beiblatt nr. 28, 11–16).

Pachystima Canbyi, A. Gray. H. Zabel. (Gartenflora, xxxviii. 138, 139).

This rare shrub of the Southern Alleghanies is in cultivation at the Garden at Münden, Germany; it is said to endure the winter well, but to grow very slowly.

Pinus ponderosa. (Gard. Chron. viii. 559, 558, fig. 110, 111, 114, 115).

Prairie Flowers of late Autumn. Byron D. Halsted. (Pop. Sci. Monthly, xxxviii. 229–236).

Prickly Lettuce.—An Introduced Weed. Miss F. Detmars. (Journ. Columbus Hort. Soc. v. 53, 54, Pl. iv).

From this article it is evident that *Lactuca Scariola* is becoming a troublesome weed in parts of Ohio.

Promising Wild Fruits.—III. A. A. Crozier. (Am. Garden, xi. 712–714, illustrated).

Consists of notes upon *Castanea Americana*, *C. pumila*, *Prunus serotina*, *P. Pennsylvanica*, *P. pumila*, *Rubus Chamæmorus*, *R. leucodermis and Asimina triloba*, the latter figured.

Pyrenomycetes, The North American: A Contribution to Mycologic Botany. By J. B. Ellis and B. M. Everhart, with original illustrations by F. W. Anderson. Published by Ellis and Everhart, Newfield, New Jersey, 1891.

We have been favored with the title-page and advance plates of this important contribution to the knowledge of North American Fungi. It is to contain about 600 pages and 41 plates, and will practically be a manual of the N. A. Pyrenomycetes. The arrangement will be in the main like that in Winter's Pilze, as being more natural than that of Saccardo. The plates are artistic as well as accurate, having been drawn in all cases from fresh material, and reflect much credit on Mr. Anderson for patience and skill.

Rhodostachys Andina. J. G. Baker. (Bot. Mag. T. 7148).

Scaphosepalum pulvinare. (Bot. Mag. T. 7151).

Shepherdia argentea und Elæagnus argentea. W. Siehe. (Gartenflora, xxxviii. 625–627, fig. 89).

Solidago speciosa. (Garden & Forest, iii. 560, fig. 74).

Supplement til St. Croix's og Jomfrusernes Flora. H. F. A. Eggers. (Vidensk. Medd. Naturhis. For. Kjobenhavn, 1890, 11–21).

An enumeration of species additional to the flora of the West Indian Island of St. Croix. *Vanilla aphylla* is described as new.

Symbolæ ad Floram Brasiliæ centralis cognoscendam. Eug. Warming. (Videnskab. Meddel. Naturhis. Foren. Kjobenhavn, 1889, 1–10; 22–44; 327–357; two plates).

These papers include an enumeration, with descriptions of new species, of the plants recently collected by Dr. A. Glaziou. The Sapotaceæ, contributed by C. Raunkier, include new species of *Mimusops*, *Sideroxylon*, *Lucuma* and *Chrysophyllum*, the Vochysiaceæ, by E. Warming, new species of *Vochysia;* the Scitamineæ by O. G. Petersen, new species of *Calathea*, *Maranta*, *Saranthe*. There are also citations of all Dr. Glaziou's numbers published in recent part of the Flora Brasiliensis, making a nearly complete record of the collections of this distinguished explorer in central Brazil. N. L. B.

Tigridia Pringlei, S. Wats. L. Wittmack (Gartenflora, xxxiii. 320–322; fig. 51).

Tillandsia streptophylla. L. Wittmack (Gartenflora, xxxviii. 288, 289; one figure).

Native of Central America.

Tupelo Tree—The. (Garden & Forest, iii. 485, 486, illustrated). Includes a full page picture of typical trees of *Nyssa aquatica.*

Viburnum—Arten aus der Gruppe Lentago. Die Nordamerikanischen. H. Zabel. (Gartenflora, xxxviii, 461-463).

This is an account of some of our species of *Viburnum* as understood by Herr Zabel. A new variety *subpedunculatum* of *V. Lentago* is described, and also a supposed hybrid between *V. Lentago* and *V. nudum=V. Vetteri.* All these studies are based on garden specimens.

Washingtonia robusta, H. Wendl. L. Wittmack (Gartenflora, xxxviii. 300-302; one figure).

A description of this California palm as studied in cultivation.

Wild Carrot. Aug. D. Selby. (Journ. Columbus Hort. Soc. v. 70-72).

A brief history of references to *Daucus Carota* in local catalogues and quotations from laws enacted designed to prevent its spreading.

Yucca gloriosa. (Gard. Chron. viii, 692, fig. 136).

Zizania aquatica. L. Wittmack. (Gartenflora, xxxviii. 262-266; three figures).

Proceedings of the Club.

The regular meeting was held on December 8th, the President in the chair, and twenty-two persons present.

Miss Elizabeth Doughty and Mr. J. T. Kane were elected active members.

Dr. Eccles read the announced paper of the evening, "Notes on the Flora of the Western Desert." It was profusely illustrated by specimens and lantern slides.

Dr. Britton read a note just received from Prof. Conway Macmillan, announcing the discovery of *Salvinia natans* in a lake near Minneapolis, Minn. He referred to its previous discovery in 1886 by Mr. C. H. Demetrio, in Missouri, (Bot. Gaz. xi. 46; BULLETIN xiii. 45), confirmed by Prof. Underwood at the Buffalo Meeting of the Botanical Club of the American Association for the Advancement of Science, (BULLETIN xiii. 171), and expressed regret that this was not considered sufficient proof of its occurrance in the Eastern United States, to cause its admission into the sixth edition of Gray's Manual of Botany.

Dr. Britton also announced that the *Clematis* collected by him at White Sulphur Springs, W. Va., in August was *C. ovata*, Pursh, as determined by a comparison made by Prof. S. H. Vines with the original specimen preserved at Oxford.

The annual meeting was held January 13th, the President in the chair, and twenty-six persons present.

Dr. R. H. Lamborn, Mr. M. M. LeBrun, Dr. Thos. Morong and Dr. J. Bernard Brinton were elected active members.

Mr. Edward L. Rand, Boston, Mass.; Mr. E. J. Hill, Engelwood, Ill.; Mr. Frank S. Collins, Malden, Mass.; Prof. Conway MacMillan, Minneapolis, Minn.; Mr. Merritt L. Fernald, Orono, Me.; Mr. Frank McDonald, Peoria, Ill.; Mr. L. N. Johnson, Evanston, Ill.; Prof. Chas. A. Davis, Alma, Mich., and Dr. Chas. B. Graves, New London, Conn., were elected corresponding members.

The reports of officers and standing committees for the past year were read and accepted.

The following officers were elected for the ensuing year: President, Hon. Addison Brown; Vice-President, Dr. T. F. Allen; Treasurer, Dr. Wm. E. Wheelock; Recording Secretary, Miss Maria O. Steele; Corresponding Secretary, Miss Helena C. Gaskin; Librarian, Mr. Maturin L. Delafield, Jr.; Curator, Miss Josephine E. Rogers; Editor, Dr. N. L. Britton; Associate Editors, Dr. Emily L. Gregory, Miss Anna Murray Vail, Prof. C. Henry Kain, Dr. H. H. Rusby, Mr. Arthur Hollick.

Dr Morong read the announced paper, "The Asuncion Market," giving an interesting account of life and manners in Paraguay.

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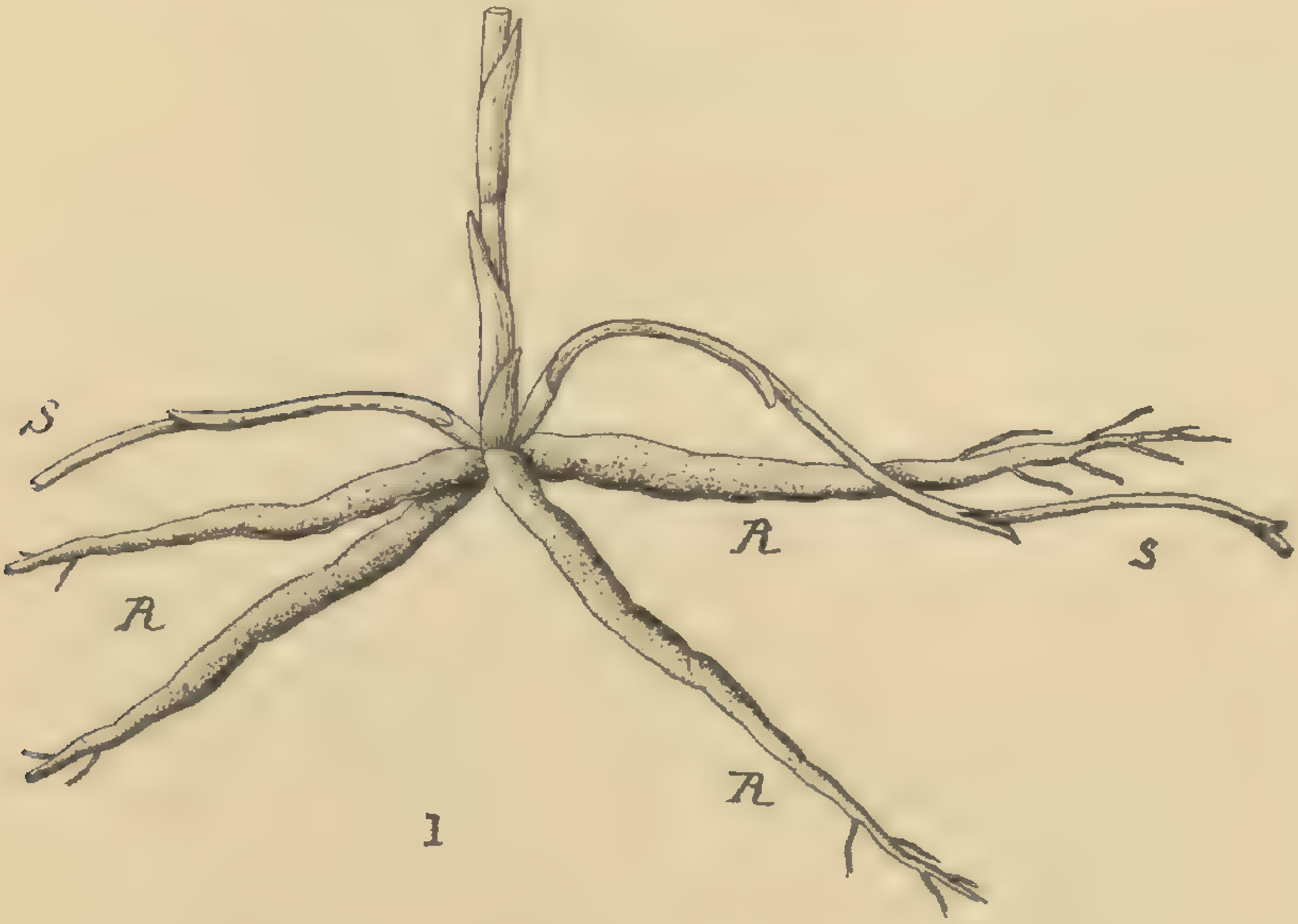

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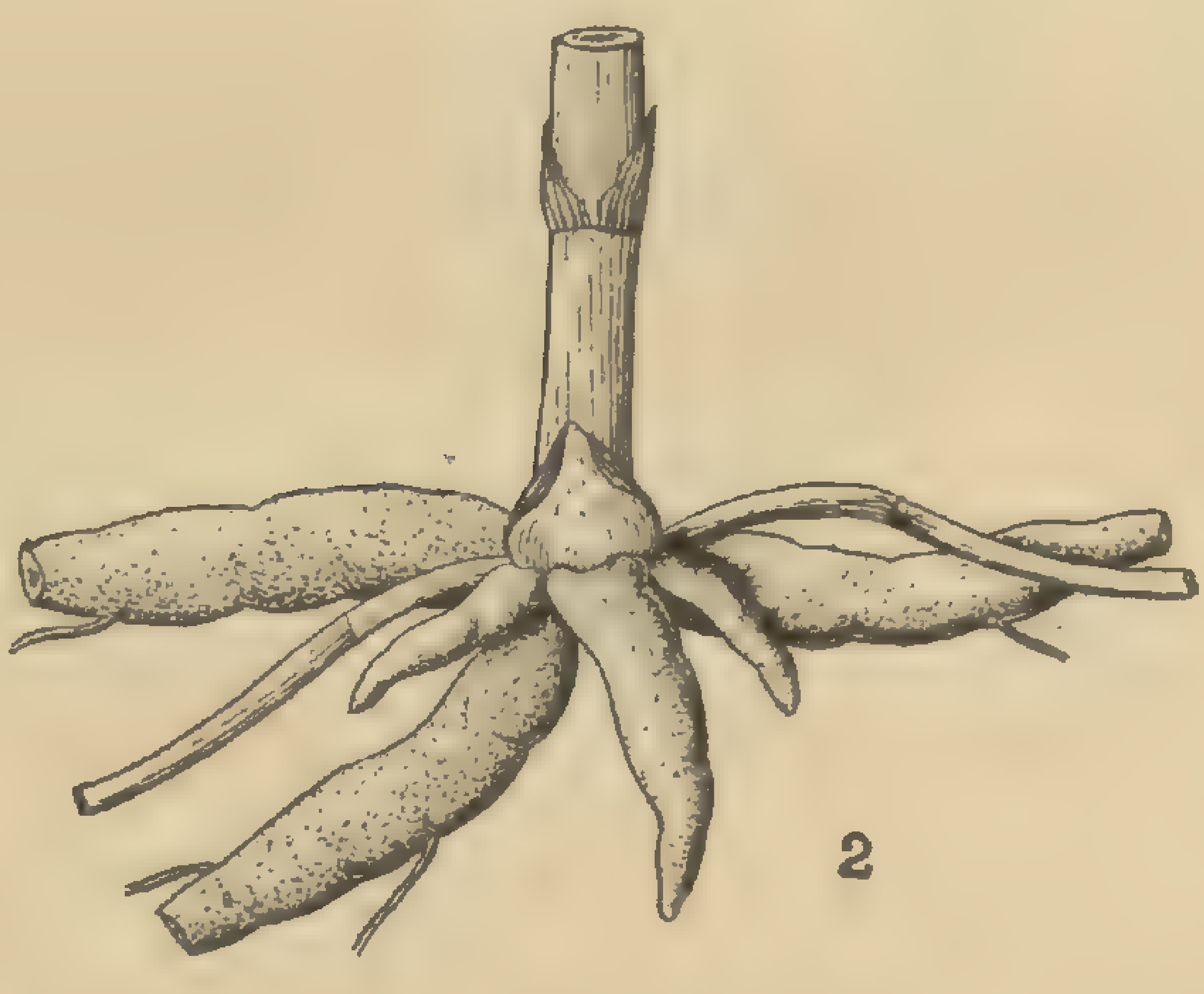

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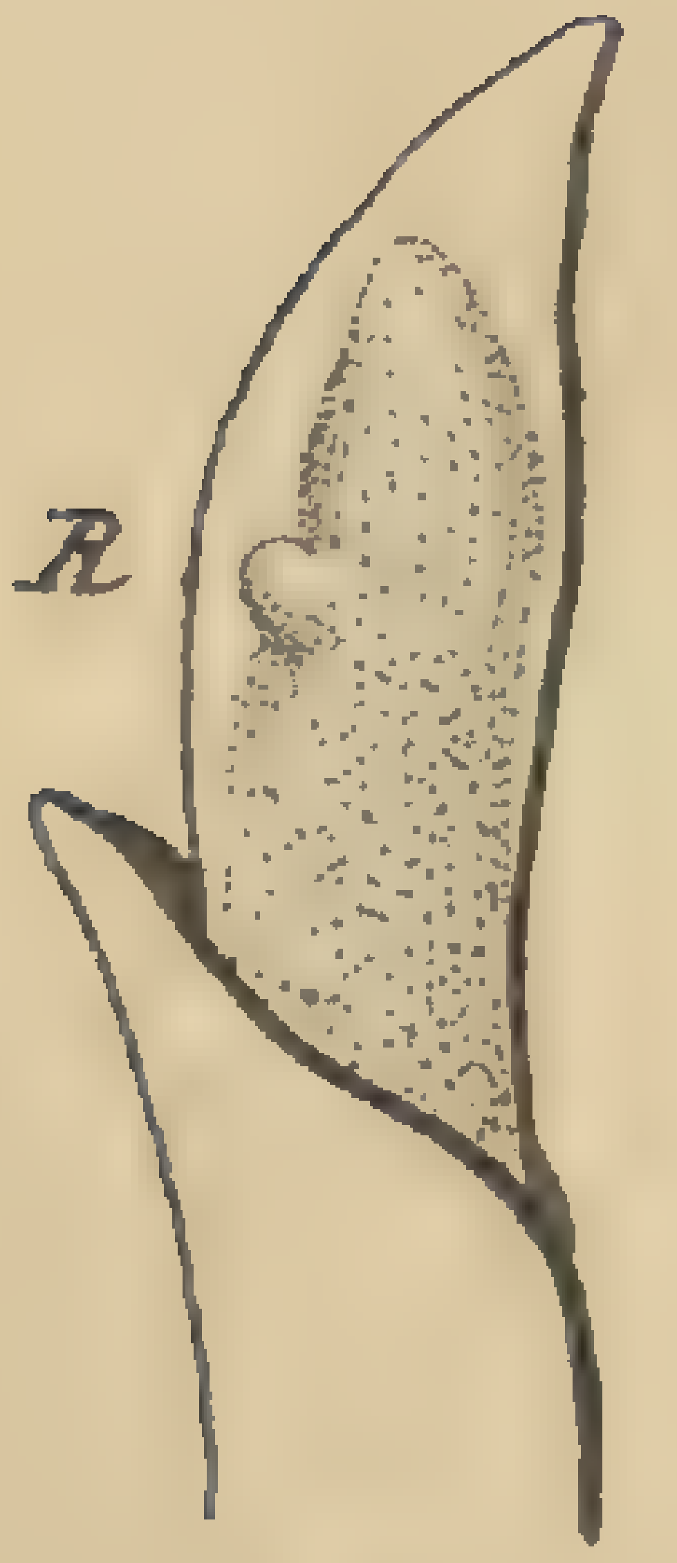

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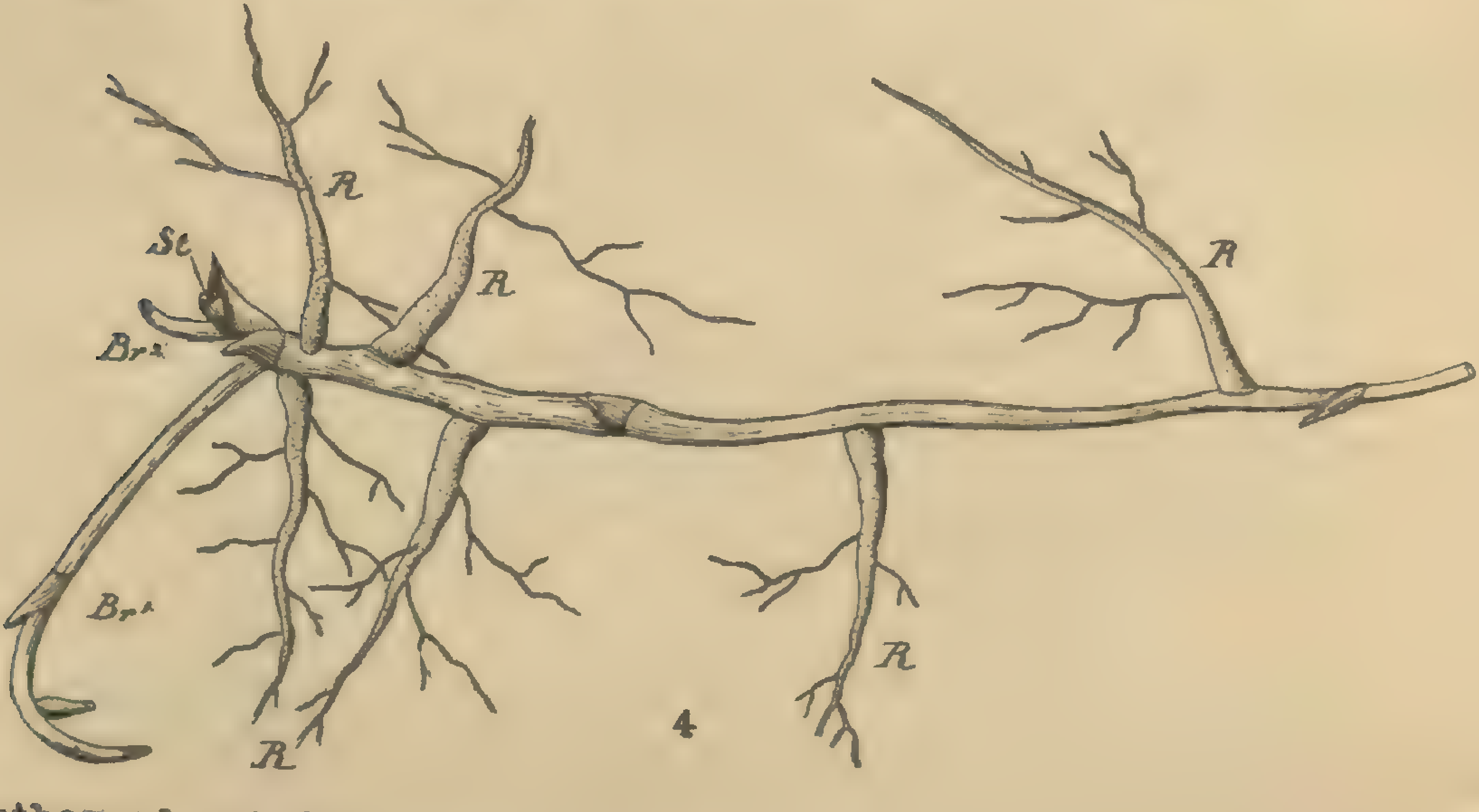
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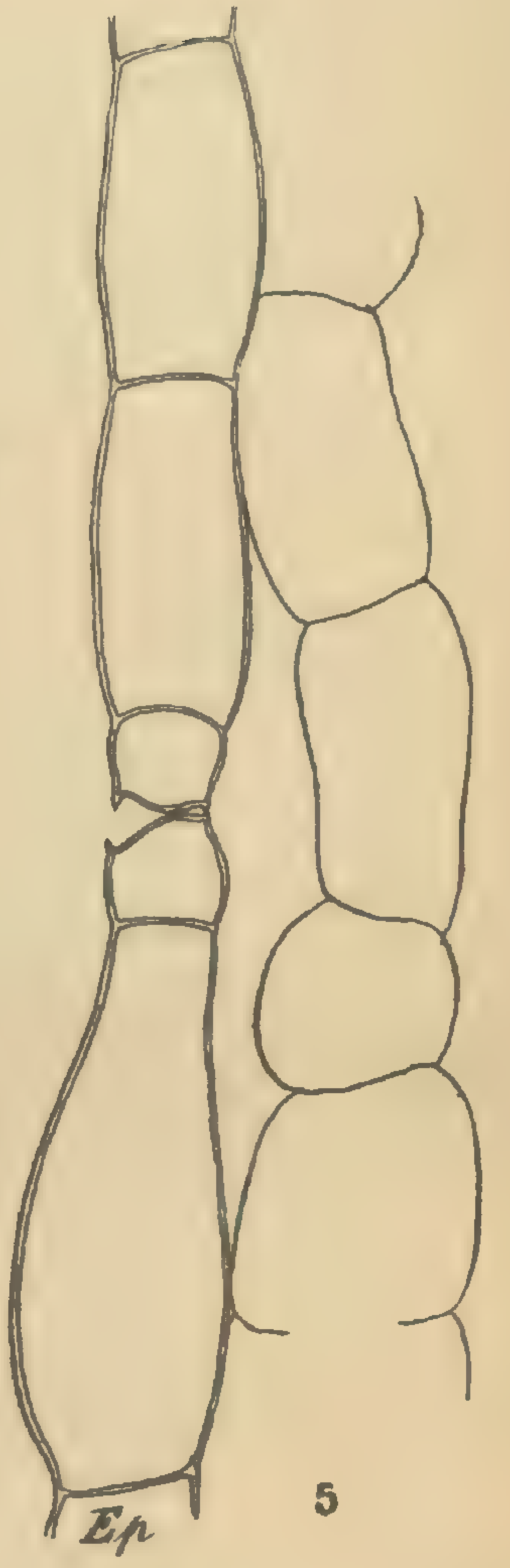

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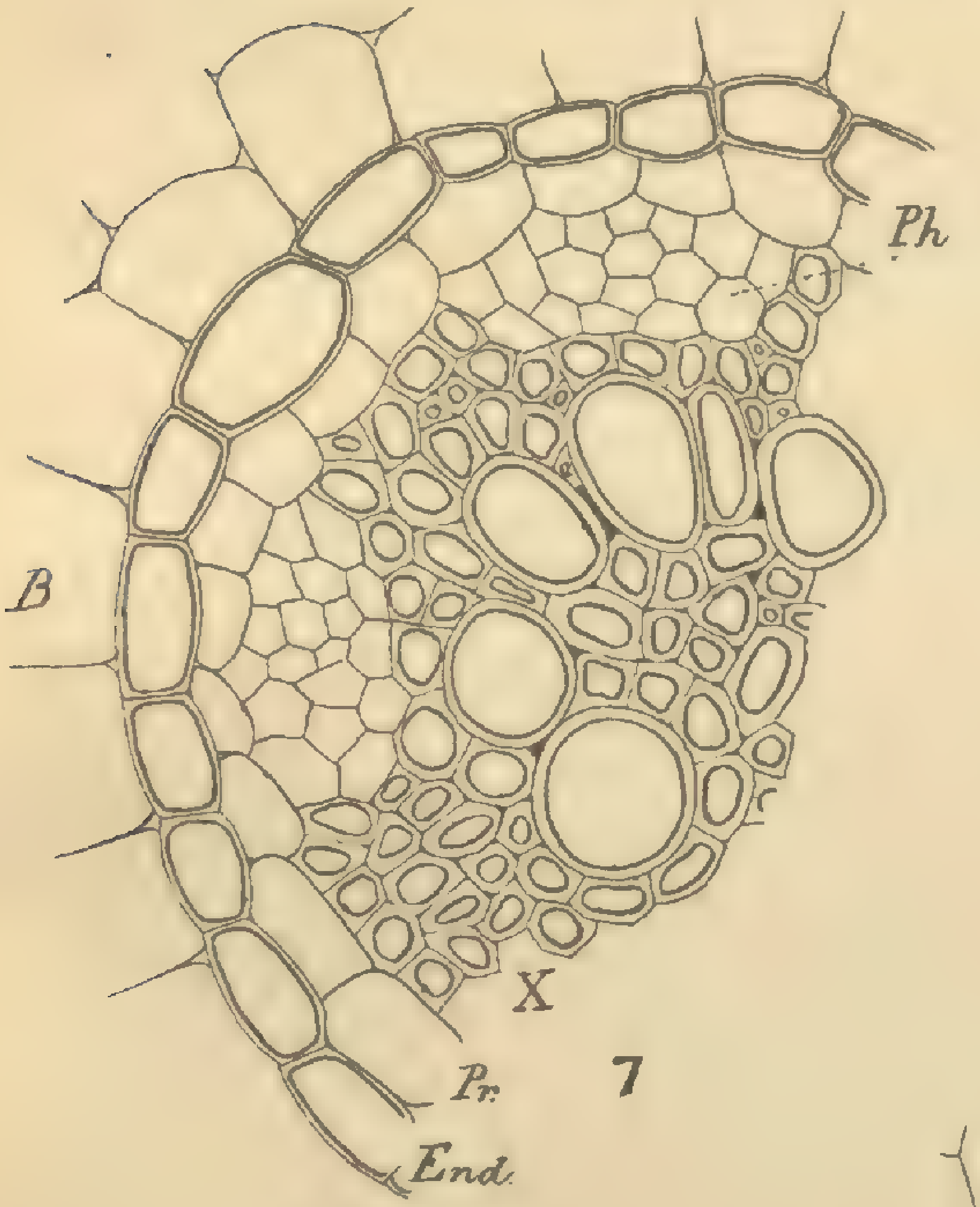

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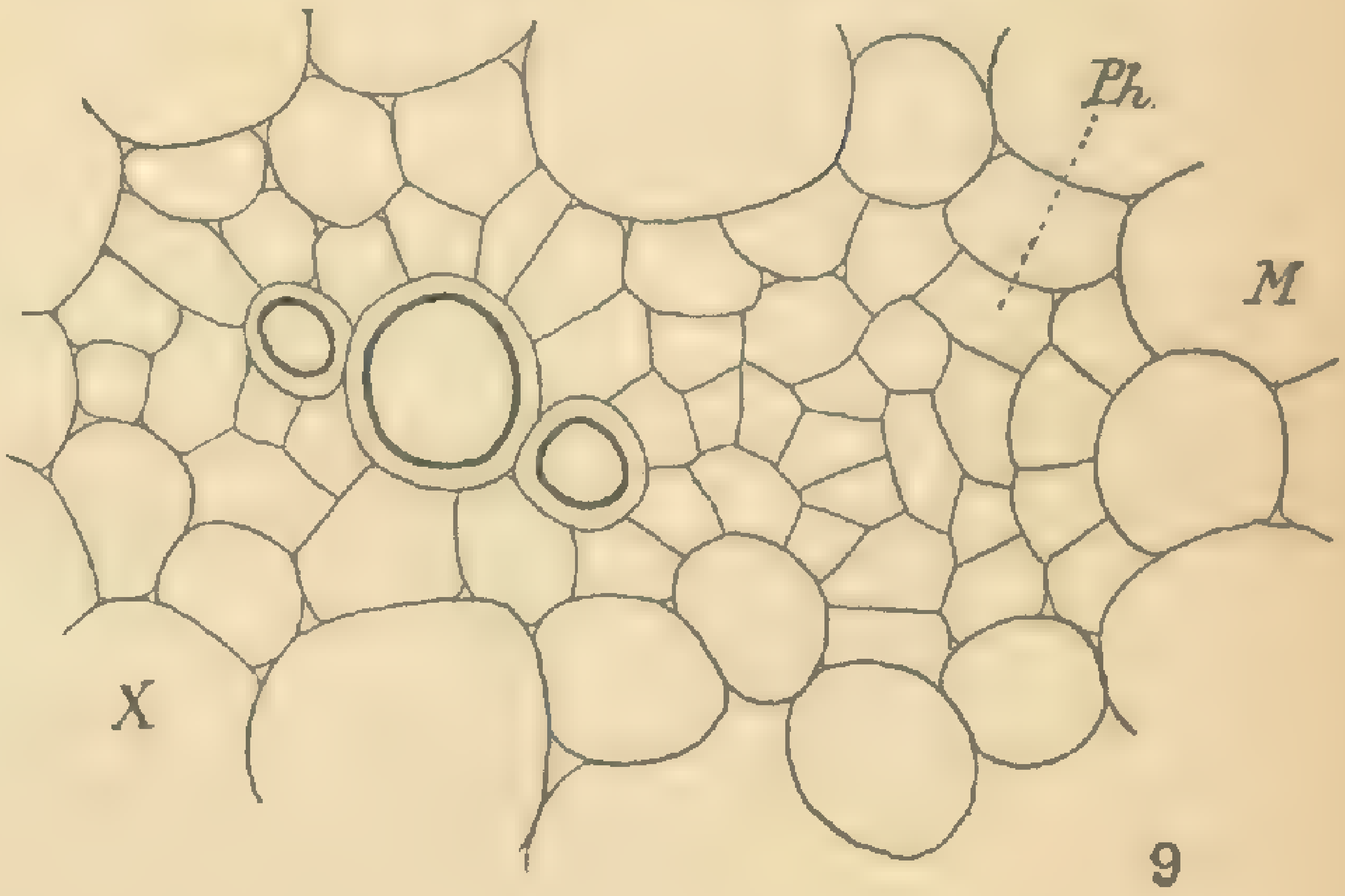

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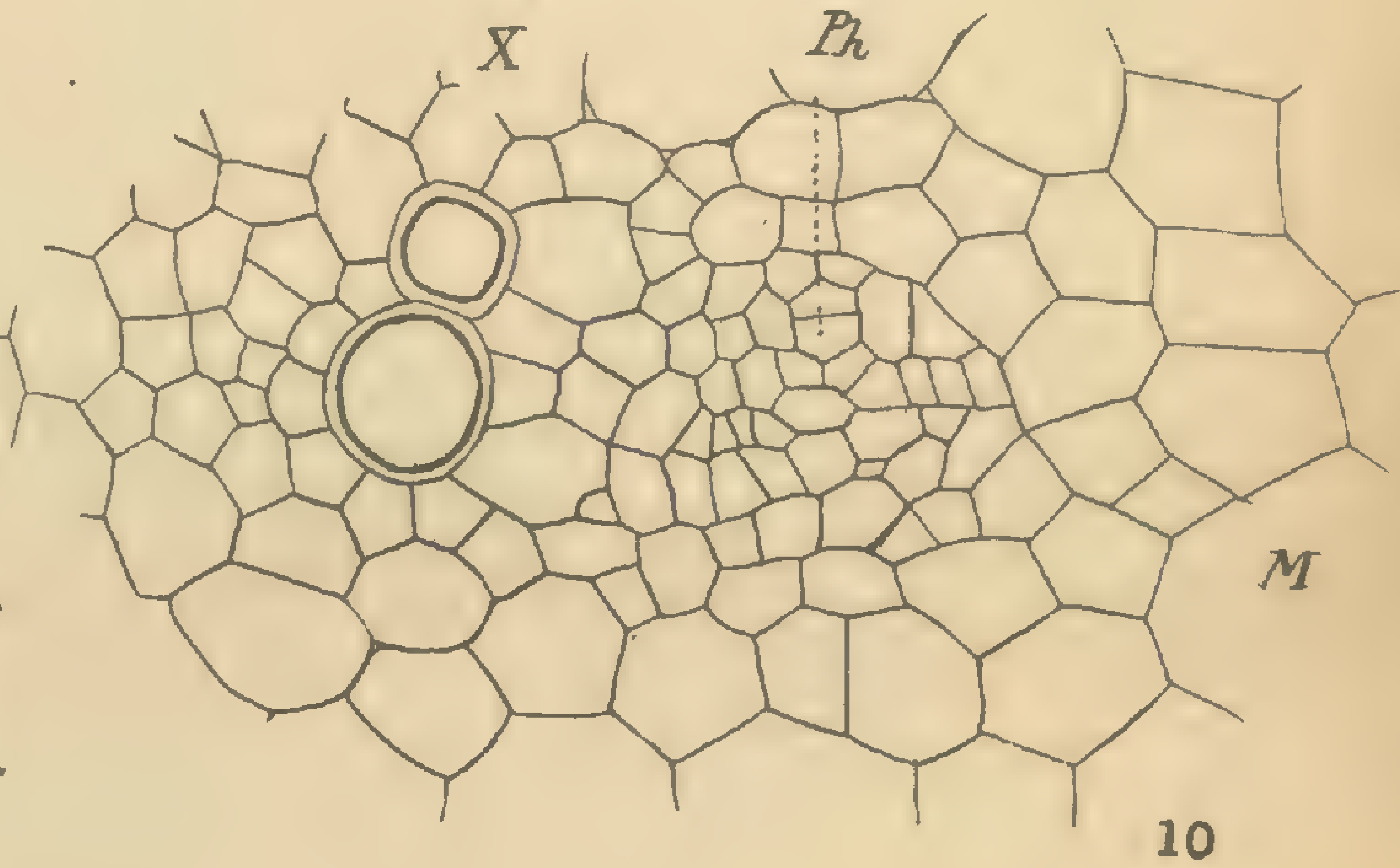

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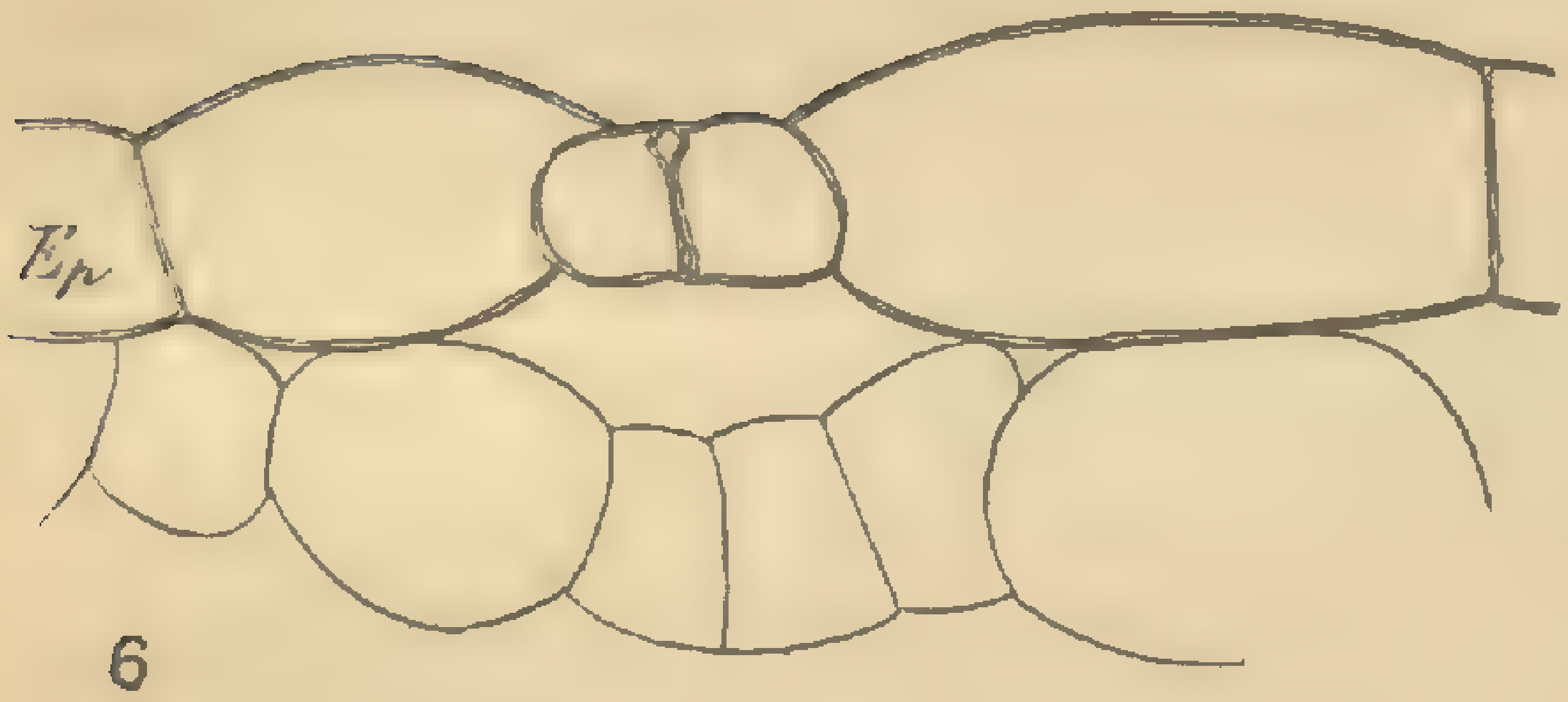

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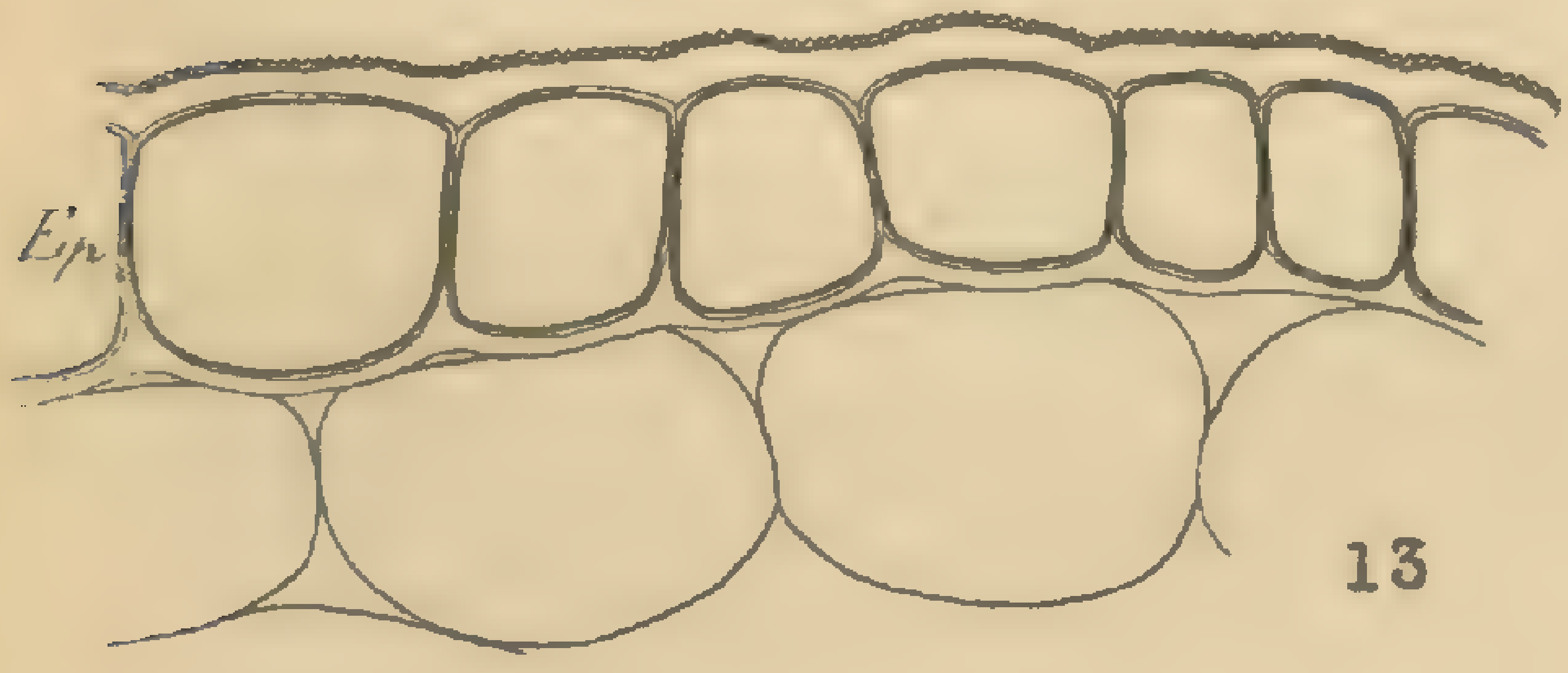

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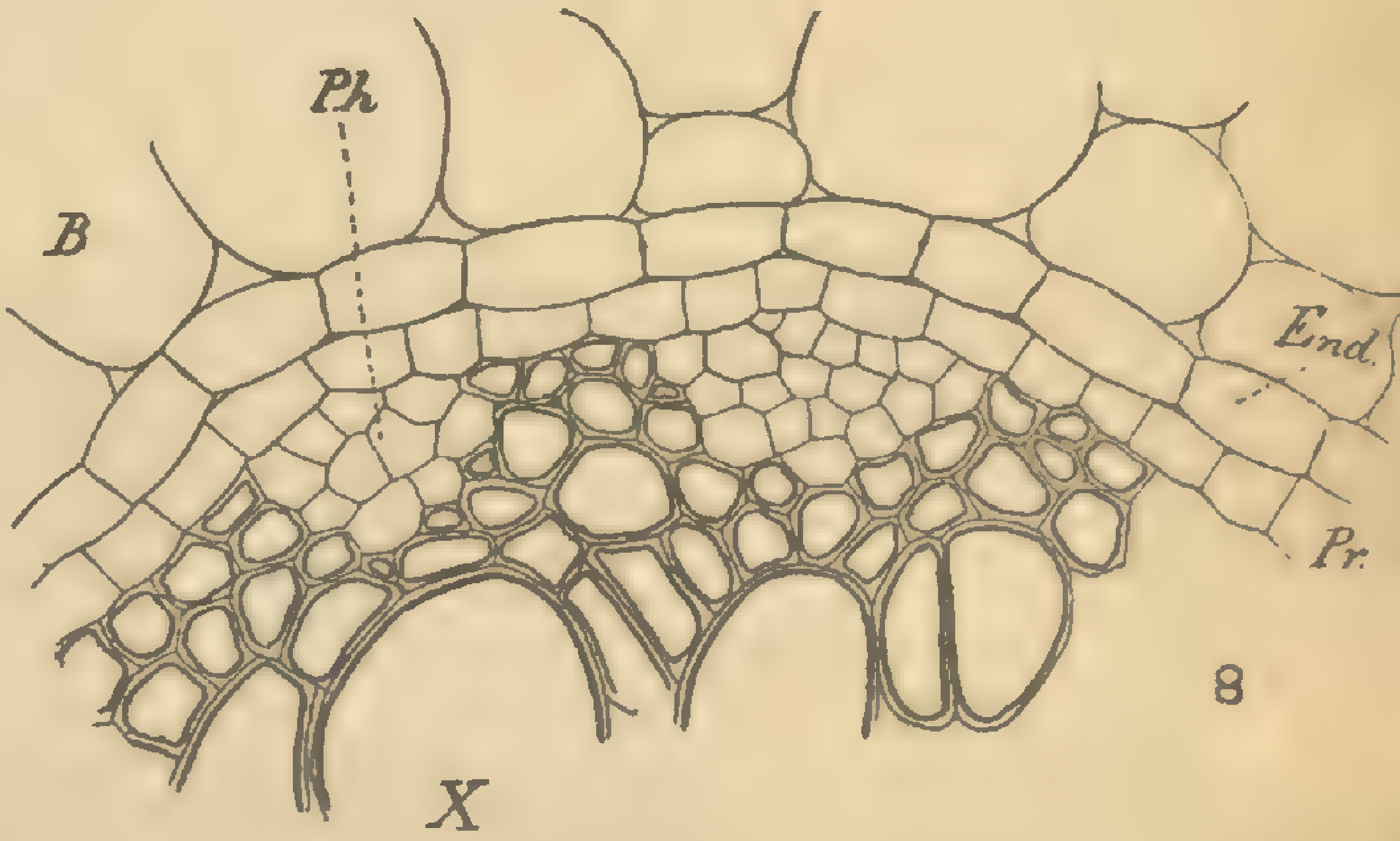

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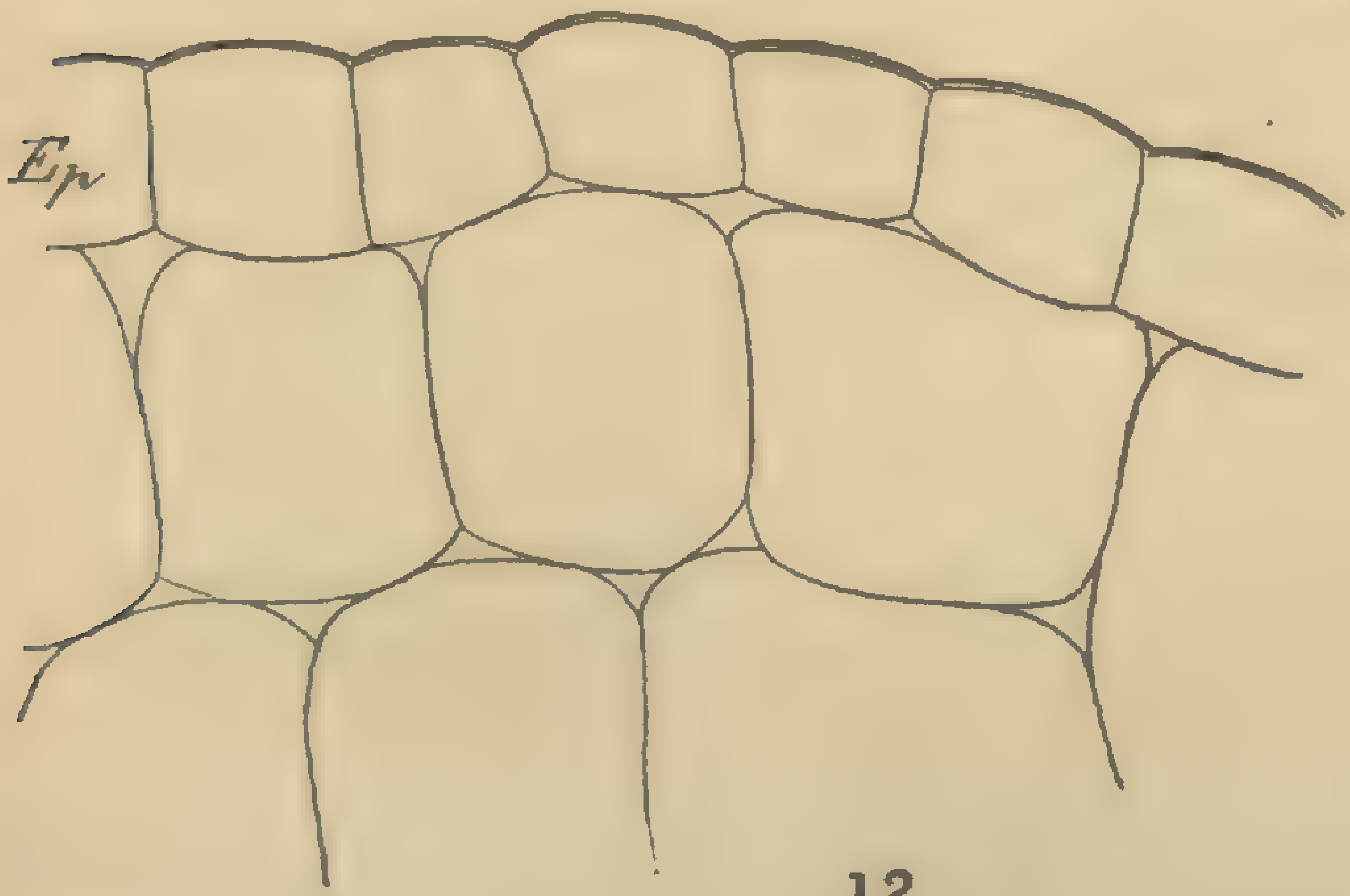

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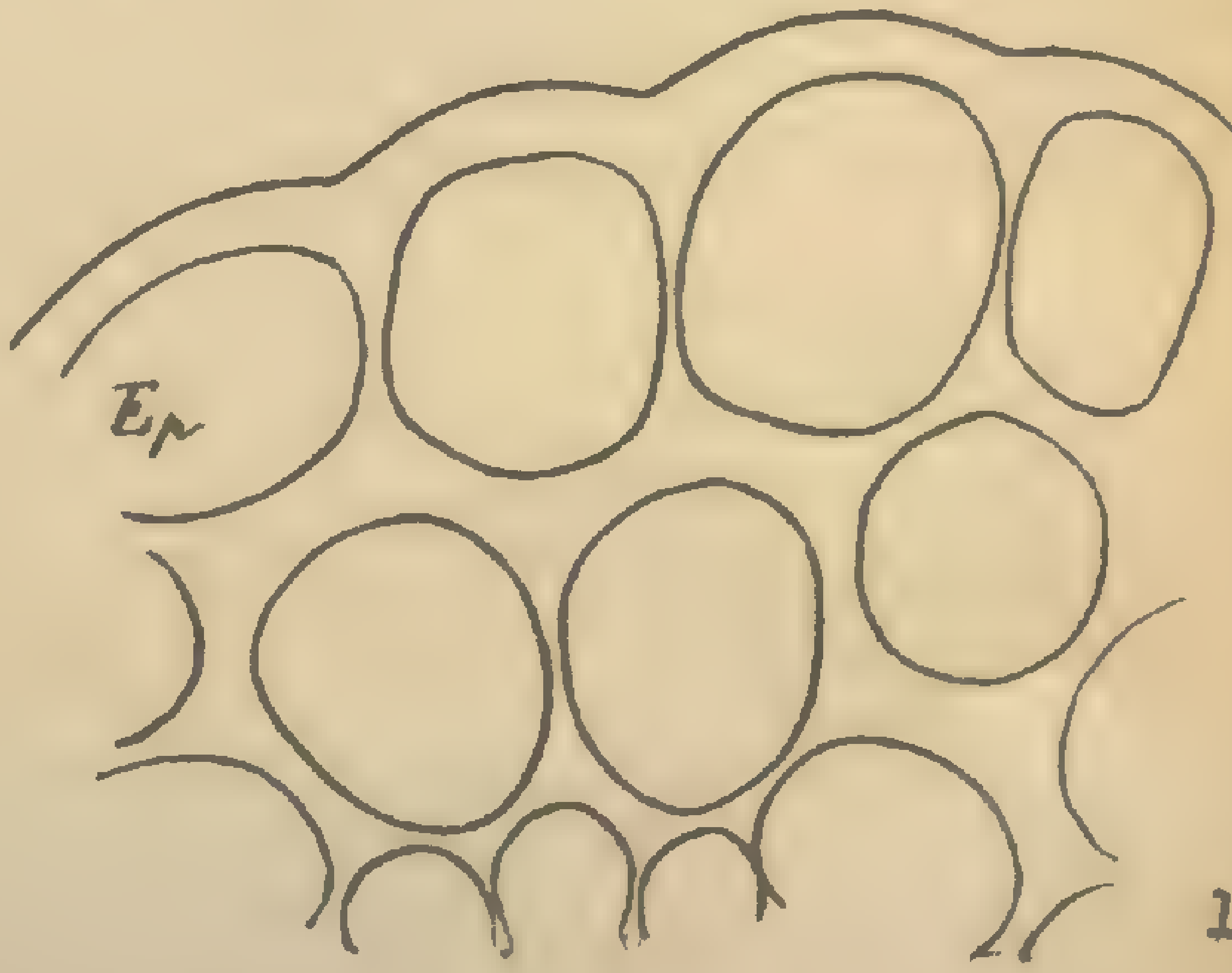

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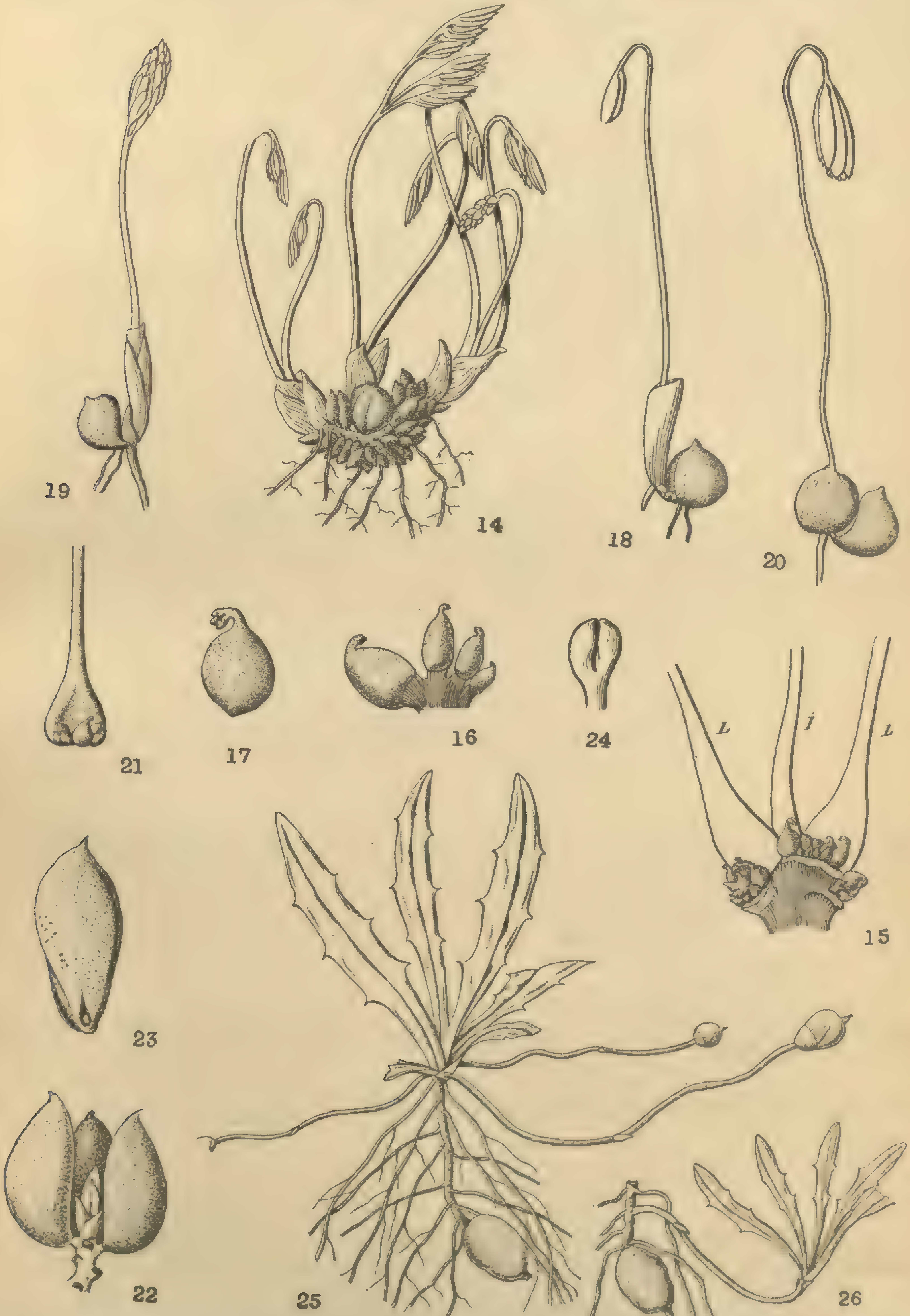
Theo. Holm.—ROOTSTOCKS OF UVULARIA AND OAKESIA.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Theo. Holm.—ROOTSTOCKS OF DICLYTRA AND KRIGIA.

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EDITED BY

NATHANIEL LORD BRITTON,

AND OTHER MEMBERS OF THE CLUB.

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Vol. XVIII.] New York, February 12, 1891. [No. 2.

An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885-1886.—XV.

(Continued from Vol. xvii. p. 284.

Begonia Altoperuviana, A. D.C. loc. cit. 123. ex. descrip. Yungas, 6,000 ft. (684).

Begonia ulmifolia, Humb. in Willd. Sp. Pl. iv. 418. Yungas, 6,000 ft. (690).

Begonia. Unduavi, 8,000 ft. (677).

Begonia scandens, Sw. Prodr. Fl. Ind. Occ. 86. Unduavi, 8,000 ft. (685, 689); Yungas, 6,000 ft. (678).

Begonia parviflora, Pœpp. and Endl. Nov. Gen. i. 7. Yungas, 4,000 ft. (692).

BEGONIA MYRIANTHA, spec. nova. § Wageneria. Ramis, petiolus, foliis subtus et inflorescentia dense fulvo-hispidis. Folia oblique ovata vel orbicularia, cordata, 7-9 loba, majores 25 cm. lata, denticulata 7-9-nervia, supra sparce hispida. Cymis masculis dichotomo-cymosis, multifloris. Flores 6 mm. lati, petalis obovatis, sepalis orbicularis, glabris.

Unduavi, 8,000 ft. (691). Related to *B. hispida*, Schott.

Begonia Clarkei, Hook. f. Ingenio del Oro, 10,000 ft. (680). The same as Mandon's No. 1090. Herb. Kew.

Begonia glandulosa, A. D.C.? Locality uncertain (688).

Begonia. Flowers of *B. parviflora?* Leaves of a plant of some different genus. Near La Paz, 10,000 ft. (687).

CACTEÆ.

Cereus, sp. Near La Paz, 10,000 ft. (2040).

Cereus, sp. Near La Paz, 10,000 ft. (2043).

HARIOTA CRENATA, sp. nov. § Alatæ. Caule ramisque foliaceo-dilatatis, lævibus, nervo medio valido, ad margines crenatis. Ramis undique sub-15-crenatis, 20-30 cm. longis, 3–6 cm. latis. Nervo medio striato. Flores parvi, laterales, sessiles. Bacca (immatura ?) 7mm. diametro. Setæ 2-5,2 mm. longæ. Calycis tubus exsertus.

Nearest *Rhipsalis platycarpa.* The generic name *Hariota* antedates *Rhipsalis.* Yungas, 6,000 ft. (2047).

Hariota ? Yungas, 6,000 ft. (2048).

Opuntia, sp. Guanai, 2,000 ft. (2044).

Mamillaria ? Yungas, 6,000 ft. (2045).

FICOIDEÆ.

Mollugo verticillata, L. Sp. Pl. 89. Falls of Madeira, Brazil (1159). Collected also at Sorata, 10,000 ft.

Mollugo Glinus, A. Rich. Fl. Abyss. i. 48. (*M. glinoides*, Camb.) Falls of Madeira, Brazil (1503).

UMBELLIFERÆ.

Hydrocotyle Bonplandi, Rich. Hydroc. No. 27, f, 7. Unduavi, 12,000 ft. (1358); Sorata, 13,000 ft. (1778). The same as Holton's No. 637 from New Grenada.

Hydrocotyle quinqueloba, R. & P. Fl. Per. iii. 25, t. 248. f. b. Yungas, 6,000 ft. (1759).

Hydrocotyle Bonariensis, Lam. Encycl. iii. 147. Tacna, Chili (1760).

Hydrocotyle ranunculoides, L. f. Suppl. 177. Near Valparaiso, Chili (1110).

HYDROCOTYLE ? ECCENTRICA, sp. nov. Caulis repens ad nodos radicans; foliis eccentrico-peltatis, longe et gracile petiolatis utriusque glabris, ovatis, tenuis, 6-8 cm. longis, apice longe accuminatus, margine serrulatis, 5-7 lobatis; pedunculis petiolis æqualis; capitulis multifloris; pedicellis 2mm. longis. Fructus non visus.

Yungas, 6,00 ft. (1761). A curious member of the group, perhaps representing a distinct genus.

Azorella biloba, Wedd. Chlor. And. ii. 195. Sorata, 10,000 ft. (1952).

Spananthe paniculata, Jacq. Coll. iii. 247. Yungas, 4,000 ft. (873).

Bowlesia lobata, R. & P. Fl. Per. iii. t. 251. f. b. Unduavi, 8,000 ft. (1958); Ingenio del Oro, 10,000 ft. (1234).

Bowlesia palmata, R. & P. loc. cit. f. a. Near La Paz, 10,000 ft. (1355).

Asteriscium Chilense, C. & S. Linnæa, i. 354. Near Valparaiso, Chili (1930).

Eryngium paniculatum, Laroch. Eryng. 59, t. 26. Yungas, 6,000 ft. (576); Unduavi, 8,000 ft. (578); near Valparaiso, Chili (607).

Eryngium elegans, C. & S. loc. cit. 348? Reis, 1,500 ft. (577).

Eryngium fœtidum, L. Sp Pl. 336. Mapiri. 5,000 ft. (905).

ARRACACIA ANDINA, sp. nov. Erectus, 30-40 cm. altus; foliis 1-2-pinnatis, 10-15 cm. longis; segmenta 5-7, late ovata, utriinque glabra, acuminata, petiolulata vel sessilia, lobata vel divisa, serrulata; involucro 0; pedunculæ numeroses, 2-3 cm. longæ; umbellulæ multiflores, pedicellis 2mm. longis; fructus ovoideus, 4mm. longus. Related to *A. esculenta*.

Ingenio del Oro, 10,000 ft. (1776). The same as Mandon's 590 and 595.

Apium leptophyllum (Pers.) F. Muell. in Benth. Fl. Austral. iii. 372. Near La Paz, 10,000 ft. (1768).

Oreosciadium dissectum (Benth.) Wedd. Chlor. And. ii. 204. Unduavi, 10,000 ft. (1767).

Oreomyrrhis andicola (Lag.) Hook f. Fl. Antarc. Unduavi 8,000 ft. (1769); near La Paz, 10,000 ft. (1770).

Fœniculum vulgare, Gærtn. Tacna, Chili (1777).

Daucus montanus, Willd. in Schult. Syst. vi. 482. Near La Paz, 10,000 ft. (1763).

ARALIACEÆ.

Sciadophyllum pentandrum (R. & P.) Poir. in Lam. Encycl. vi. 747. Yungas, 6,000 ft. (609).

SCIADOPHYLLUM PANICULATUM sp. nov. Caule arboreo? Foliis 8-9-digitatis, crasse petiolatis folioles longe petiolulatis ovalis vel ellipticis, apice acuminatis, basi rotundis, margine integris, supra glabris, subtus velutinis, 12-15 cm. longis, 6-7 cm. latis inflorascentia paniculata; floribus capitatis, capitulis 8-10 mm. diametro. Apparently nearest *S. angulatum*.

Mapiri, 5,000 ft. (608).

Dendropanax arboreum, Dec. & Pl. Guanai, 2,000 ft. (2691).

OREOPANAX RUSBYI, sp. nov. Arbor? Folia simplicia, coriacea, petiolata, ovato-lanceolata, serrulata, trinervia, 10-15 cm. longa, 5-7 cm. lata, supra glabra, subter pallida, reticulata velutina; capitula breve et crasse pedunculata, 2 cm. diametro (fruct); flores sessiles; bacca 6-7 mm. diametro.
Yungas, 6,000 ft. (2654).

CAPRIFOLIACEÆ

Sambucus Peruviana, H.B.K. Nov. Gen. iii, 429. Unduavi, 8,000 ft (727). The same as Mandon's No. 325, Herb. Kew.

Viburnum glabratum, H.B.K. loc. cit. 428. Mapiri, 5,000 ft. (2469). Yungas, 4,000 ft. (2584).

Viburnum Ayavacense, H.B.K. loc. cit. Guanai, 2,000 ft. (2560).

Viburnum tinoides, L. f. Suppl. 184. Unduavi, 10,000 ft. (725).

Viburnum lasiophyllum, Benth. Plant. Hartweg, 189. Sorata, 10,000 ft. (726).

RUBIACEÆ.

Ourouparia Guianensis, Aubl. Plant. Guian. i. 177. Guanai, 2,000 ft. (2104).

Cinchona condaminea, Humb. & Bonpl. Pl. Æquin. i. 33. Yungas, 6,000 ft. (2347).

Cinchona succirubra, Pav. Yungas, 4,000 ft. (2348).

Other species of *Cinchona* were collected but were not included in the general distribution.

Cascarilla, sp. Junction of the Rivers Beni and Madre de Dios (2867).

Manettia ignita (Vell.) Schum. in Mart. Fl. Bras. vi. Pars. vi. (2) 171. Mapiri, 5,000 ft. (1126).

Manettia luteo-rubra, Benth. Linnæa, xxiii. 445. Yungas, 6,000 ft. (2159).

Manettia splendens, Gardn. in Herb. Kew. Guanai, 2,000 ft. (1127). Name not in Schumann's Rubiaceæ of the Brazil Flora.

Manettia Lygustum, Sw. Prodr. Fl. Ind. Occ. 37? (*M. coccinea*, Willd.). Junction of the Rivers Beni and Madre de Dios (2478). The same as Spruce's No. 3874, Herb. Kew.

Mantitia, sp. Collected only in fruit. Probably undescribed. Mapiri, 2,500 ft. (2158).

The Flora of the Desert of Atacama.

By Thos. Morong.

Under the old geographical limits, before Chile had appropriated as a war indemnity the whole of Bolivia's seacoast and three degrees of Peruvian soil, the desert of Atacama was figured as extending from Coquimbo on the south to Bolivia on the north and eastward from the Pacific Ocean to the Andes, being nearly coincident with the province of the same name in Chile. So far, however, as the natural features are concerned, the name might well be applied to the entire region lying between Valparaiso and Ecquador, for it is all a desert broken only by lofty mountain peaks and deep valleys, the beds of ancient rivers, and watered here and there by scanty streams derived from the melting of the snows upon the high Cordilleras. The water from this source is carefully husbanded by the inhabitants of the valleys, and used in irrigation for agricultural purposes. Very little of it goes to produce the flora referred to in this article, by far the greater part of which belongs exclusively to the desert proper.

It seems like a contradiction in terms to speak of a *desert* vegetation, and especially one upon a territory so bleak and desolate as the Atacama, which is distinguished by the number of its hideously barren hills of rock and its sandy wastes. And yet this desert bears a flora quite extensive in the number of its species and very peculiar and interesting in its character. Over 500 species of plants have been gathered within its borders, and probably as many more might be detected upon a close research. One naturally wonders by what chance such a flora can be brought into existence and how it can live after being once started. In explanation it must be said that this region is not absolutely rainless, although it is nearly so. There is an occasional winter rain, or rarely two or three showers in the course of a winter, occurring at long intervals. Generally such rains are barely enough to moisten the ground, but that little is sufficient to cause the seeds, which are lying dormant in the sand or the bulbs beneath the ground, to germinate. Once up the seedling is kept alive by the dews which fall nightly upon the earth, and by the mists that hang around the hills every morning in the winter and spring-time. In this way these growths obtain moisture enough to enable them to reach maturity. Besides this the Atacaman plants have acquired several peculiarities which admirably adapt them to their conditions of life. One of these lies in the power of the seeds to live for many years in the dry sand without germinating. They have been known to retain their vitality for ten years and then to sprout at the touch of rain.

I suspected from appearances that a special weather protection existed in many or all of these seeds, and Dr. Gregory of Barnard College, who has, at my request, kindly examined microscopic sections of a number of species, confirms my suspicions so far as these particular species are concerned. The seeds in every case proved to have unusually thick walls and a copious supply of albumen around the embryo. In one instance (*Pintoa*) she reports that the "seed coats are heavy, the outer one having peculiar shaped cells which turn to mucilage on coming into contact with water." Another (a *Tristagma*) has "copious albumen and the outer walls are thickened and turned in color to a dark brown, making an extremely hard coat." *Calandrinia* seeds presented a coating "somewhat heavy, but with a peculiar readiness to break on contact with water." *Cristaria* has an integument of several layers which together make a thick wall, and the interior albuminous. *Viola* shows in the seed coat a contrivance similar to that of *Pintoa*, with more or less of albumen in the interior.

While seeds are thus fortified against a protracted drought, tubers and bulbs are equally well equipped by the large amount of water or milk which they store up. I found many of the bulbs that I collected so full of juice that I could squeeze it out in a stream by hand.

Another peculiarity of the herbaceous flora, evidently acquired, is the early age at which the plants begin to flower and fructify. As if aware that they have only an ephemeral life and that what they have to do must be done quickly, they are scarcely above ground before they put forth blossoms. Many species may be seen in flower when hardly an inch in height, and which go on flowering until they reach the stature of two or three feet—if they can survive so long. I was continually deceived by this habit, naturally supposing that these wee things must be different in species from plants that I had seen elsewhere only as tall and robust when in flower. A little more experience, however, convinced me that these Liliputians were merely taking time by the forelock.

Still another adaptation, excited apparently by the conditions under which they exist, is the extraordinary number of seeds formed by many plants and scattered over the soil in which they grow. This habit is not confined to species which usually yield great numbers of seeds, but seems common to all the desert flora. Thus a little violet which seldom attains a height of three inches, common about Caldera, often exhibits from thirty to forty pods full of seeds upon a single plant. When one looks down upon it, he can see only a mass of yellow flowers and fruit pods. I might mention many other plants in which the same peculiarity is noticeable.

One other apparent adaptation deserves mention. It is said that a majority of the desert plants are shrubs, or at least, are suffruticose, and this accords with my own observation. I found that such growths are in the habit of shedding their leaves in the summer instead of winter, thus reversing the ordinary process of nature. By this means they reduce their vital expenditure to a minimum at a season when they need to husband their utmost strength in order to resist long and continued dryness. This leaves them free to exert their full powers at a period when they are most likely to imbibe the revivifying moisture. Aided in this by their thick, long and knotty roots and close, non-evaporating bark, these shrubs, which seem to be nothing but dead stocks in the summer, can withstand even several years of drought.

After premising this much concerning the locality and the flora in general, I will give some account of my own explorations in the Desert of Atacama. It was my good fortune to reach Caldera, the sea-port of Copiapo, in the month of September last, which is early spring time in that latitude. It also happened to be a year when this rare flora had sprung up, a thing which I understood from residents had not occurred for several years previously. A single rain had fallen in the month of June, and at the time of my visit the plants were in full bloom. Had the visit been made two months later, I was assured that not a flower would have been in sight.

The sandy slopes around Caldera, especially where the soil was shaded by rocks, bore quite a number of species, the most common of which was a dusty-looking composite (*Encelia tomentosa*, Walp.) wlth pale yellow ligulate flowers, known popularly as *Corona de fraile*, so-called from the convex mass of disk flowers which remind one of the shaven crown of a priest's head. Several other species of Compositæ also occur in this vicinity, such as *Polyachyrus fuscus*, Walp., a tomentose plant with much dissected leaves and showy, oblong, close-flowered heads of purple florets, *Chuquiraga acicularis*, Don., a half shrubby, bushy, and very forbidding plant, which has crowded spine-tipped leaves, and small heads with yellow spinescent scales, and a *Closia*, the flowers and odor of which put one in mind of our Chamomile. Two delicate *Cuscutas* twined about small plants on the open sand, one of them with silk-like stems and white flowers, and the other with masses of purple blossoms. Both of these are popularly named "*Cabellos de angel*," Angel's hair. Lying close against the sides of rocks was a queer Asclepiadaceous shrub known as *Cynoctonum viride*, Phil. The stock which manages to survive the summer is short and stumpy, with a thick head like an old pollard willow, from which it sends out new green shoots whenever the winter rain falls. Out upon the open sand one frequently meets with *Frankenia aspera*, Ph., throwing its dark colored branches over the ground, *Scilla triflora*, Ph., a bulbous plant with erect stems and racemes of pretty white flowers, and *Oenothera Coquimbensis*, Spach., one of the species noticeable for commencing to flower when not much larger than a needle, and continuing the process till it is two feet in height. Here too I collected several species of *Eritrichium*, *Heliotropium*, *Osteocarpus*, *Tetragonia*, and other plants which there is no room to mention.

After rambling over the Caldera sands till my feet grew weary, I made a number of expeditions on horseback and by rail to more distant points. One of these was to a gorge among the hills seven or eight miles north of Caldera, known to the people as the "*Quebrada* (ravine) *de los leones*." I was informed that the name owed its origin to the fact that in former years a number of pumas or Chileno lions had been killed in the ravine. Here also lovers of the chase had often come to hunt the guanaco, an animal somewhat smaller than the llama, but belonging to the same family. Neither lion nor guanaco, however, appeared to welcome me to his lair, a circumstance which I did not much regret. On the way to this mountain defile we rode along the sea-shore for several miles, and then struck inland over a wide track of loose, shifting sand into which our horses sank nearly half way to the knees, and which is continually blown about by the wind. Along this route I gathered a number of interesting plants. Among them was a *Calandrinia*, the common name of which is "*Pata de guanaco*," or guanaco's foot, so-called from the fancied resemblance of the shape of its leaves to the hoof of the guanaco. This elegant flower throws up a tall, branching stem, each branch bearing on long naked peduncles several large and brillant purple blossoms, a conspicuous object upon the desert. Another species, or perhaps only a variety of this, much smaller in size, grows near the sea-shore, having a bright yellow corolla. In clumps around which the sand is often heaped in ridges as if against a wall occurred an odd-looking, yellow–flowered shrub of the Apocyneæ, (*Skytanthus acutus*, Meyen), popularly named "*Cuerno de cabra*," or Goat's horn, from the singular habit which its long, pointed follicles have of twisting themselves into the shape of a pair of goat's horns. The resemblance is so exact, that every one calls them by that name at first sight. In similar situations is found an *Ephedra*, vulgarly "*Pingo-pingo*," the naked sharp-pronged stems of which seem just in place in such a region. We frequently rode through mounds of sand in which clumps of these two shrubs were completely buried.

Farther along the sand was firmer, but attended by a new danger to the horseman. A small lizard, of a livid color and some six or eight inches in length, the only animal that we encounted in our excursion makes its burrow in these inhospitable wastes. As the animal is quite gregarious in its habits, we often came upon spaces entirely honeycombed by scores of these little creatures. Riding incautiously upon such ground our horses would suddenly sink over the fetlock into these burrows and stumble badly, running great risk of breaking a limb or throwing the riders over their heads. About such spots, however, some charming flowers were obtained. One of these was *Cruckshanksia Geisseana*, Ph., an elegant plant, covered with masses of showy yellow flowers, very fragrant, and remarkable for its involucral, long-stiped sepals. Another was a Bignoniaceous species, named *Argylia*, which has long, finely dissected radical leaves, and a scape ten or twelve inches high, having a large cluster of yellow trumpet-shaped flowers at the summit. Still another plant of much interest, growing in clumps, was an Umbellifer called *Eremocharis*, a tall almost naked stemmed undershrub, with long internodes and curious subbipinnatifid leaves, which emit the odor of apples when first plucked or bruised.

Along this route also grew some of the most peculiar Cacti that I had ever seen. The most noticeable of all belongs to a genus created by Philippi, and is, I believe, confined to this desert, named *Eulychnia breviflora*. It throws up from a cluster of roots numerous columnar stalks about as large in diameter as a man's arm, and armed with innumerable long, unequal, needle-like spines. The flower is on the summit of the stalk, not unlike a large cup in aspect, the lower part of which is covered with crinkly velvet hairs of a lavender hue, above which rises a single row of stiff white petals, including a host of delicate stamens. Another Cactus of the melon variety, not over eight inches high, and not unlike a pineapple in shape, has its spines twisted about the stem so that they resemble a bird's nest, inside of which the small red flowers hide like eggs.

When we reached the Quebrada, we found it to be a very rocky ravine running up the hillside between two eminences, along the slopes of which were heaped many boulders, as if carried down there by floods in former ages. Among the rocks trickled a small stream of water, which soon lost itself in the sand at the bottom of the ravine. As the day was quite warm, and I was heated and tired with my long ride, it sounded very pleasant to hear the gurgling of water, and as I have often done on such occasions in the White Mountains, I hastened to scoop up a drink in the hollow of my hand. My companion, a native Chileno, laughed at my motions, and with good reason, for I had no sooner tasted the water than I spit it out with disgust. Who could drink brine?

All the pools and rivulets which occur in this region absorb more or less soda from the soil, which seems everywhere impregnated with this mineral. Luckily we carried with our lunch a bottle of the condensed water used in Caldera, or we should have been unable to quench our thirst. For this disappointment I was consoled by finding a number of beautiful flowering plants among the boulders that filled the ravine.

The most attractive of the plants were a very handsome species of *Alstrœmeria*, which exhibited great lilac flowers, the petals streaked with blue veins and yellow blotches, and a tall *Centaurea* with white heads as gay looking as those of our Ox-eye daisy. A shrubby *Euphorbia*, five or six feet in height, with large white flowers, was abundant. This plant possesses a copious milky juice which pours from every wound made in its stem or leaves, and from this property is popularly called *Lechero* (milkman) and hence has been named by Philippi *E. lactiflua*. A pretty *Stachys* peeped from under the rocks whose shade it loves, and a broad-leaved, clammy *Nicotiana* and a *Solanum*, heavily laden with trusses of bright purple blossoms grew in more sunny spots. In this vicinity also flourishes a flower greatly coveted by the inhabitants of Caldera and called by them *Añuña* (*Habranthus añuña* Phil.). It springs from a bulb of the size of an onion and bears at the summit of a tall scape a cluster of yellow tubular blossoms. The most charming of all the plants collected in this quarter is a *Tropacolum* (*T. tricolor*, Lind.) a delicate vine which climbs upon shrubs in thick masses, profusely decorated with spurred corollas whose bright tints of orange, red and blue offer a standing invitation to all the humming birds that live in the vicinity.

A few days after returning from this excursion, I made another in the company of a friend to a craggy hill known as the *Morro*, some ten miles south of Caldera. Morro is a Spanish word denoting any object that is round and over-hanging, and is applied on the coast to high rounded promontories that project into the ocean. Our route to this promontory lay by the seaside, around a lovely bay and across a beach two or three miles in extent, which at low tide is as smooth and hard as a floor. So beautiful was the day and so pleasant the ride by the sparkling blue waters of the Pacific, that even if there had been no botanical interest in the trip, I should have been more than satisfied. I returned, however, with my portfolio full of specimens of unique interest to the botanist. Before reaching the seashore or upon its borders, we passed through clumps of various species of *Nolana*, *Dolia*, *Phaca*, *Malesherbsia*, *Suaeda* and other plants which I will not attempt to describe. One species, however, deserves mention on account of its eminent fitness for a desert life, and that is an *Euphorbia*, named *E. Copiapina* by Philippi. It has a multitude of short stems which rise directly from a huge underground tuber, and lie in a circle upon the ground. The stems, leaves and flowers are lurid in hue as if burnt by a tropical sun, and the tuber, in aspect much like a big turnip, is full of milk. Other things might perish in that rainless climate, but such a tuber would be preserved for many years in the dry sand.

It was a very rugged and precipitous ascent that we had to climb when we struck the Morro. In places there was no path, the rocks were sharp, and the feet of our horses were continually sliding out from under them. In spite of such obstacles we finally reached the summit, and then hobbling our steeds we sat down to rest and to look around us. The view seaward was simply magnificent. The broad Pacific stretched out in its illimitable vastness towards the west, and the coast line of sandy plains, hillocks and rocky capes, indented by beautiful bays and estuaries, could be seen for miles until it faded into haze. Around us were jagged cliffs and deep precipices descending to the sea, but to my amazement a garden of beauty clothed the few patches of soil which lodged upon the summit and in the crevices of the rocks. Here were in this savage looking place at least a score of the finest species of flowers that I had yet discovered in the Atacama. *Nolana elegans*, Ph., fairly hid the backbone of the highest ridge with its bells of blue. *Achyrophorus*, a Composite with large golden heads, adorned the lower slopes. Fine specimens of the *Calandrinia* and *Alstroemeria* already collected at the Quebada de los leones added their bright hues to this mountain park. *Loasa Urmenetæ*, Ph., ran over other plants or trailed upon the ground. A handsome *Verbena* and a little *Gilia* enlivened the scene. Several species of *Oxalis* occurred in sandy nooks, the most curious of which was *O. gigantea*, a thick watery stemmed shrub, as high as my head, the upper part of the stalk bearing a long spike of yellow flowers arranged irregularly around the rachis. Here, too, is found the only *Tillandsia* known in the region (*T. Geisseana*, Ph.), which is, strangely enough, a cactus epiphyte. Many other interesting species besides these were added to my collection in this attractive spot, not the least valuable being six or seven rare lichens. No doubt the remarkable fertility of this rugged headland is owing to the clouds which bathe its brows with moisture every night and morning in the months of August, September and October.

I have space only to give a brief sketch of an excursion that I subsequently made by rail from Caldera to Monte Amargo, twenty-five miles inland. The engineer, a pleasant and well-informed Englishman, invited me to take a seat with him in the engine where, he said, I could survey at my leisure the road and the arid pastures on which the mules were feeding. I saw numbers of mules, it is true, and in fact, as they have a special fondness for collecting in droves upon the railroad track, we came near running over some of them, a calamity which I learned was by no means infrequent, but what the creatures could find to feed upon passed my comprehension, unless it were a very disagreeable plant that seems smeared with varnish over all its parts, and known from that fact as *Alona vernicosa*. An animal which could browse on such herbage must be quite able to relish tar, varnish and such-like substances. This plant occurs all along the railway to Monte Amargo, and bears a very pretty bright blue flower. Possibly it was the flowers that attracted the mules, as it could not have been the taste.

Monte Amargo itself is only a railway station situated in a soda swamp. In the alkaline pools around it I gathered several species of Characeæ and Naiadaceæ, and in the bogs were growing a number of saline plants such as *Salicornia* (*S. Peruviana*, HBK.), *Triglochin* and several Cyperaceæ. Through this swamp runs the Copiapo River, or rather the modicum which is left of it after being used for irrigation in the valley above. It goes no further, being here absorbed by the desert sands. Upon its banks I saw for the first time the Chañar tree (*Gourliea Chilensis*, Clos.), a sturdy close-branched, somewhat spiny shrub, which at the time of my visit was loaded with its bright yellow flowers. This shrub yields a toothsome fruit something like a plum, that is greatly relished by man and beast. It is often dried and carried as food upon journeys. I saw old stones lying under the trees which had been gnawed into by desert rats, which are extravagantly fond of the kernel. Here, too, was a gigantic *Juncus*, its numerous thorn-pointed stalks ten feet in height and spreading in all directions like chevaux de frise. It required considerable courage to thrust the hand among these spears in search of specimens.

Out upon the open sands I came upon a flora different from any previously collected. Here I began to meet with the *Adesmias* which are so numerous on the Pacific coast. Philippi enumerates 134 species that occur in Chile alone. More than a dozen of them have been discovered in the Atacama Desert. In this locality likewise flourishes *Eritrichium guaphaloides*, DC., which the inhabitants of the province of Copiapo call *Te del burro* or *Te del campo*, and of which they make an infusion and drink like Chinese tea. The *Acacia Cavenia* and *Lycium Chilense* stand like lonely sentinels upon the desert. Many other things rare and interesting greeted me in my wanderings over this region, but they cannot be noticed here. Of course the cosmopolitan plants, which go wherever man goes, were here to nod their familiar forms in my face. *Sonchus oleraceus*, *Solanum nigrum*, *Erigeron Canadense*, *Argemone Mexicana*, *Raphanus sativus*, *Erodium cicutarium*, *Gnaphalium purpureum*, and half a dozen other old friends were there to make me feel at home in this strange and distant land.

I was pretty well fagged out with my day's tramp when I heard the puffing of the train on its way back from Copiapo. My good friend, the engineer, was kind enough to respond to the waving of my handkerchief by stopping the cars and giving me a snug seat in the locomotive. Of my three rides none proved more enjoyable or botanically more profitable than the one on the iron horse to Monte Amargo.

Contributions to American Bryology.—II.

By Elizabeth G. Britton.

A Supplementary Enumeration of the Mosses Collected by Mr. John B. Leiberg in Idaho, with Descriptions of two new Species.

(Plate CXIV).

Continued from Vol. XVI., Page 112.

Andræa petrophila, Ehrh. Dry slate rocks, Traille River basin, May, 1889 (6).

Buxbaumia indusiata, Brid., previously listed as *B. aphylla*, L. Decaying logs, Traille River basin (159).

Georgia pellucida, (L.) Rab. (*Tetraphis pellucida*, Hedw). Decaying logs, Lake Pend d'Oreille, May, 1889 (155).

G. geniculata (Girgens). Braith. (*T. geniculata*, Girgens). Decaying logs in deep ravines, basin of Traille River, July, 1889 (194).

Oligotrichum Lyallii, (Mitt.) Lindb. Packsaddle Mountain, 8,500 feet, Lake Pend d'Oreille (73).

Polytrichum commune, L. Granite basins, near Rathdrum (229).

P. piliferum, Schreb. On rocks, Lake Pend d'Oreille, June, 1889 (110).

Var. *Hoppei*, Rab. (*P. Hoppei*, Hornsch.) Packsaddle Mountain, 6,000 ft. alt., Lake Pend d'Oreille, July, 1889 (163).

Fissidens limbatus, Sull. On granite ledges between high and low water line, Lake Pend d'Oreille, March, 1889, fertile (144).

F. osmundoides (Sw.), Hedw. With the above, sterile.

F. adiantoides (L.), Hedw. var. *immarginatus*, Lindb. Shores of Lake Pend d'Oreille, September, 1889, fertile (214).

Ditrichum flexicaule (Schleich.) Hpe. (*Leptotrichum flexicaule*, Hpe.) Exposed quartzite ledges, Traille River basin, September, 1889, sterile (232).

Dicranella secunda (Sw.), Lindb. (*D. subulata*, Schimp.) Shady canyons, Traille River basin, in woods, North Fork basin, May and June, 1889 (189).

Dicranella crispa (Ehrh.) Schimp. Upturned trees, broken soil, Traille River basin, September, 1889 (69).

Blindia acuta, (Huds.) Br. & Sch. On schistose boulders, deep ravines, Bareknob Range, Traille River basin, July, 1889 (207).

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Dicranowcisia crispula, (Hedw.) Lindb. Granite ledges, Lake Pend d'Oreille, May, 1889 (193).

Dicranum schisti (Gunn.), Lindb. (*D. Blyttii*, Br. & Sch.) Fissures of quartzite rocks on mountains, 4,000–5,000 ft alt., near Rathdrum, April, 1889 (178).

D. Starkei, Web. & Mohr. Granite ledges, Lake Pend d'Oreille, 5,000-8,000 ft., July, 1889 (205).

Dichodontium flavescens (Dicks.) Lindb. (*D. pellucidum*, var. *serratum*, Schimp.) Wet rocks in streams, spray of waterfalls, Lake Pend d'Oreille, March and May, 1889 (62).

Phascum acaulon, L. var. *piliferum* (Schreb.) Braithw. Grassy open places, Lake Pend d'Oreille, Feb. 1889 (117).

Pottia Heimii, (Hedw.) Fuernr. Clark's Fork of the Columbia, Lake Pend d'Oreille, Sept., 1889 (212).

Mollia tortuosa (L.) Schrank. (*Barbula tortuosa*, Web. & Mohr.) Crevices of rocks near water line, Lake Pend d'Oreille, also shifting sand bars, mouth of Clark's Fork, March, 1890 (235).

Tortula subulata (L.) Hedw. (*Barbula subulata*, Beauv.) Upturned roots, Lakeside, March, 1890 (210).

T. mucronifolia, Schwægr. (*B. mucronifolia*, Br. & Sch.) Sandy soil, mouth of Clark's Fork, Lake Pend d'Oreille, Sept. 1889 (209).

Barbula rubella (Hoffm.), Mitt. (*Didymodon rubellus*, Br. & Sch.) Banks of silt, Clark's Fork, Sept. 11, 1889 (211). Ledges and loose boulders, low water mark, Lake Pend d'Oreille, Sept. 1889 (227).

Hymenostylium curvirostre (Ehrh.) Mitt. (*Gymnostomum curvirostrum*, Hedw.) Wet limestone ledges, 2200 ft. alt., Lake Pend d'Oreille, March, 1890 (46).

Leersia alpina (Sm.) Lindb. (*Encalypta commutata*, N. & H.) Loose soil on mountains, 3,000–5,000 ft. Lake Pend d'Oreille, May, 1889 (33).

L. extinctoria (L.) Leyss. var. *pilifera*, (Funck.), Braithw. (*Encalypta vulgaris*, Hedw. var. *pilifera*, Schimp.) In small bright yellow cushions on naked soil, 2,500 ft. alt., on Cape Horn Mountain, Lake Pend d'Oreille, April, 1890 (242).

L. SELWYNI (Aust.) (*Encalypta Selwyni*, Austin). On magnesian limestone and dolomites in canyons, Lake Pend d'Oreille, May–July, 1889 (166).

Grimmia apocarpa, Hedw. Wet rocks, Traille River basin, March, 1889 (157).

Var. *rivularis*, (Brid.) W. & M., (*G. rivularis*, Brid.) Traille River, March, 1889 (151). On basaltic rocks, Spokane River, May, June, 1889 (226).

G. conferta, Funck. Exposed granite ledges, Lake Pend d'Oreille, April, 1890 (245).

Var. *obtusifolia*, Sch. in same locations (246).

Var. *pruinosa* (Wils.) Braithw. (*G. pruinosa*, Wils.) Very common on dry limestone ledges, Cape Horn Mountain, 3,000 ft. alt., April, 1890 (247).

Grimmia torquata, Hornsch. Since the description of the fruit was published, (BULLETIN, xvi. 107), Mr. Leiberg has collected much finer specimens showing the fugacious peristome, and annulus. The teeth are short and broken, with a median line; the annulus is composed of many rows of cells, falling in fragments with the lid. (See Rev. Bryol. xvi. 64).

GRIMMIA PHILIBERTIANA, n. sp., Plate CXIV. Rare on quartz croppings of metaliferous veins, 6,000 ft. alt., divide between Traille River and Independence Creek, Sept. 27, 1889 (219).

Diœcious; plants pulvinate in small dark green cushions; stems 2-3 cm. high, naked and decumbent below, branching and spreading above; leaves erect-incumbent when dry, not secund, spreading when moist, 1½-2 mm. long; lanceolate, carinate, with recurved margins, and toothed hair-points 15 mm. long, but generally deformed and bearing granulose, globose propagula on the tips of the leaves or retuse and bifid along the midvein; cells above rounded, hexagonal, nearly 1 μ in diameter, faintly sinuous and oblong at base, discolored, with slight enlargement at the basal angles; vein heavy 1½ μ wide at base, rounded at back, sulcate above. Perichætium also deformed, leaves broader, inner short, triangular and hyaline at base. Pedicels one or two from the same perichætium; seta twisted, variously bent, 3-5 mm. long; capsule 1 mm. long, broadest at the mouth, smooth when dry, pale with a red rim; columella long, slender, excurrent; teeth recurved, red, undivided, with five or six short, broad segments below and four or five slender papillose internodes above; annulus of very delicate cells; lid with a beak nearly 1 mm. long, straight or oblique, calyptra mitrate just covering the beak.

Mistaken for *G. Hartmanni,* Schimp. (BULLETIN, xvi, 340, and Rev. Bryol. xvii, 16) which it so closely resembles that the figures given by Husnot (Musc. Gall. t. xxxix) and Braithw. (Brit. Mosses. t. xlviii.) would do for either. Specimens were sent to M. Philibert, whose excellent description in the Revue Bryologique xiv. p. 50, seemed to me to answer perfectly to my specimens. He kindly sent me fruiting specimens from Corsica, which differ in the plants being much larger, with stems 6-7 cm. long, leaves much twisted and secund, narrower and longer, much less deformed by propagula; with cells much more sinuous and the teeth of the peristone less papillose and *bifid?* so drawn by Mr. Anderson to whom I sent the only perfect peristome of *G. Hartmanni.* But it is evident that this is not always true, for Philibert says of these same Corsican specimens " Dents lanceoleés-lineares, obtuses, entieres, d'un rouge orangé assez pâle; tres-lisses dans les deux tiers inferieurs; le tiers superieur, légèrement papilleux." Ours are not *obtuse*, bright red not orange-colored, and conspicuously papillose. The difference between figs. 28 and 35 is also not so great in all specimens, these being extremes.

Dedicated to M. H. Philibert, Prof. honoraire de la Faculte des lettres, Aix, Bouches-du-Rhone, France, who has kindly furnished me with fruiting specimens, and who says: " Je croix que cette forme dois constituer une espèce nouvelle."

G. Muehlenbeckii, Schimp. Granite ledges, Lake Pend d'Oreille, May, 1889 (3 pp.).

G. montana, Br. & Sch. var. *brachyodon* (Aust.) L. &. J. Granite ledges, Lake Pend d'Oreille, May, 1889 (53 pp.). Quartzite ledges, 5,000 ft. alt. Rathdrum, April, 1889 (188).

G. alpestris, Schleich. Granite ledges, Chilco range, 6,500 ft. alt., May, 1889 (40). On erratic blocks of granite, Lakeside, Lake Pend d'Oreille, March, 1890.

G. ovata, W. & M. (*G. commutata*, Huebn.). Ledges near water line, Lake Pend d'Oreille, April, 1889, Feb., 1890, (13 & 17).

G. calyptrata, Hooker. On dry granite boulders, 2,500 ft. alt. Lake Pend d'Oreille, March, 1890 (55).

G. campestris, Burchell (*G. leucophæa*, Grev.). Dry exposed ledges, in closely adhering whitish tufts, Spokane River at Post Falls, above high water mark, April, 1890 (239).

G. Nevii, C. M. (*Racomitrium Nevii*, S. Watson). Wet ledges, Lake Pend d'Oreille, May, 1889 (19 pp).

G. canescens (Timm.) C. M. (*R. canescens*, Brid.). Rocky places, Lake Pend d'Oreille, Sept., 1889, fertile (149). On the ground on gravel bars in Traille River, submerged at high water, very abundant, sterile, July, 1890.

G. hypnoides (L.) Lindb. (*R. lanuginosum*, Brid.). Granite ledges, Lake Pend d'Oreille, sterile, July, 1889 (47).

G. ramulosa, Lindb. (*R. microcarpon*, Brid.). Granite ledges, Lake Pend d'Oreille, May, 1889 (186).

Pohlia pulchella, (*Webera pulchella*, Schimp.). Lime springs, Gold Creek, Lake Pend d'Oreille, April, 1890 (237).

BRYUM LUCIDUM, n. sp. (BULLETIN, xvi, 340).

Plants slender, scattered not gregarious, light glossy green; stems from radiculose stolons, 2-3 cm. high, simple and naked below; leaves rosulate, not twisted when dry, 3-5 mm. long, broadly elliptical above, with parallel margins at base, blunt with the vein disappearing below the apex or with a serrate-cuspidate point; vein heavy and frequently red at base, tapering and vanishing below the apex; margins of long prosenchymatous cells forming small appressed teeth, entire below. Cells of the lamina parenchymatous, elongated hexagonal. 1 × 2μ.

Diœcious. Pedicels single, 3-4 cm. long, stramineous, lustrous and sulcate; capsule reflexed, horizontal or erect, 5-7 mm. long, constricted below the mouth, neck short; teeth with a very faint median line (omitted in fig. 5) segments of endostome split, cilia 3-4 not appendiculate, faintly papillose, very irregular, variously divided and elongated; lid apiculate, calyptra cucullate, annulus not seen.

This species belongs to the section Rhodobryum nearest to *B. proliferum* (L). Sibth. (*B. roseum*, Schreb.), from which it differs in its habit, size, leaves not twisted when dry, pedicels single, marginal cells of leaves longer and in the irregular, not appendiculate cilia.

Collected on mountain slopes near Rathdrum in May, 1889 (224) and on the ground among pine needles, slopes of the Traille River; alt. 4,500 ft., Oct. 18, 1889, fruiting. Also sent to me in exchange for the above by Prof. D. C. Eaton, collected by R. S.

Williams at Tiger Butte, Montana, June 19, 1887 (60); also by John Macoun, who found it on the summit of the Gold Range, B. C., alt. 6,000 ft. under *Abies subalpina*, Aug. 8, 1889, sterile, named by N. C. Kindberg *Mnium simplex*, ms.; quite recently received from W. N. Suksdorf, collected in Falcon Valley, Washington, May 8, 1890 (7) sterile.

Meesia triquetra (L.) Lindb. (*M. tristicha*, Funck). Along open places by every mountain stream, July, 1890 (255).

Bartramia Œderiana (Gunn.) Sw. Precipices and ledges of the Chilco Range, May, 1889. Wet rocks in cold ravines, Traille River basin, April, 1889 (118).

B. ithyphylla, Brid. Fissures of rocks, Packsaddle Mt., 8,500 ft., July, 1889 (50).

B. Menziesii, Turn. Granite ledges, Lake Pend d'Oreille, April and May, 1889 (122).

Leskea polycarpa, Ehrh. Granite ledges, Lake Pend d'Oreille (240).

Pseudoleskea atrovirens (Dicks.). Br. & Sch. Outcroppings of quartz veins, Traille River, divide, Sept., 1889 (220).

Amblystegium Sprucei, Bruch. Crevices of rocks, Lake Pend d'Oreille, May, 1889 (216).

A. cordifolium (Hedw.) DeNot. Edges of beaver ponds, Lake Pend d'Oreille, Oct., 1889 (222).

Limnobium dilatatum, Wils. (*L. molle*, Br. & Sch.) Sterile, on ledges at low water line, Lake Pend d'Oreille, Sept. 1889 (265).

L palustre, Huds. Mountain streams, Lake Pend d'Oreille, Sept., 1889, sterile (215).

L. arcticum, Sommerf. Waterfalls, Traille River basin, Sept., 1889, sterile. (16pp). In cold mountain streams, Sept., 1890, sterile (266).

L. obtusifolium (Hook.), L. & J. Submerged rocks, swift mountain streams, fertile (16). In 10-25 feet of water, Lake Pend d'Oreille, sterile (79). According to Lesquereux and James. Manual, p. 400, this species is rare in fruit, having been found but once by E. Hall and then without the operculum, but specimens in the James herbarium labelled *Rhynchostegium rusciforme*, Br. & S., collected by Bolander in rivulets, California are fertile and operculate. Mr. Leiberg's specimens show a short, oblique, operculum and great diversity in the basal cells of the leaf.

Isothecium stoloniferum, Hook. Granite ledges, in shady places, Lake Pend d'Oreille, May, 1889 (58 and 174).

Pterigynandrum filiforme, Hedw. On granite ledges, Lake Pend d'Oreille (23).

Heterocladium dimorphum, (Brid.) Br. & Sch. Mineral Point, Lake Pend d'Oreille, sterile on dry slate ledges (175). On quartzite ledges 5,000 ft. alt., divide between Traille River and Independence Creek, Sept., 1890.

Heterocladium aberrans, Ren. & Card. With *H. loreum*, fertile; shady woods on the ground, Traille River basin, 1888 (84pp). Granite ledges Lake Pend d'Oreille with *Isothecium*, May, 1889 (174pp). On rocks, trees and on the ground, along streams, April, 1890 (138).

H. heteropterum, Sch. On quartz croppings of metalliferous veins, Traille River basin, June, 1890; also in large mats on ledges, near water line, along Traille River, July 19, 1890 (254).

Hylocomium parietinum (L.), Lindb. (*Hypnum Schreberi*, Willd). Granite ledges, Lake Pend d'Oreille (168).

H. squarrosum, L. Grassy places, Traille River, Sept., 1889 (71).

Tripterocladium leucocladulum, Muell. (*Platygyrium rupestre*, Kindb. BULLETIN xvii. p. 276.) Compared with the types kindly sent me by Chas. Mohr of Mobile, Alabama, and with Macun's Canadian Mosses No. 469. Crevices of granite ledges, shores of Lake Pend d'Oreille, sterile, April, 1890. Hanging in dense masses from escarpments of dolomite, in shady cañons, North Gold Creek, Lake Pend d'Oreille, fertile. May, 1890 (241).

Pterigophyllum lucens, Brid. Traille River basin, July, 1890 (249).

Climacium dendroides, W. & M. Traille River basin, Feb. 1889 (176).

Antitrichia curtipendula, Brid. var. *gigantea*, Lesq. On trees, Traille River Basin, June, 1889 (177).

Alsia abietina, Sull. pl. m. In one location only under overhanging ledges. Lake Pend d'Oreille, March, 1889 (156).

Description of Plate CXIV.

Fig. 1.—BRYUM LUCIDUM, E. G. BRITTON, about natural size.

Fig. 2.—An enlarged capsule.

Fig. 3.—The peristome more highly magnified.

Fig. 4.—A very young capsule, with calyptra considerably magnified.

Fig. 5.—One tooth of the outer peristome considerably magnified.

Fig. 6.—Portion of the inner peristome, showing three of the cilia ; one of them branched.

Fig. 7.—A leaf somewhat enlarged.

Fig. 8.—Tip of leaf highly magnified.

Fig. 9.—A portion highly magnified, showing basal cells and margin.

Fig. 10.—A portion highly magnified, showing lateral marginal cells and their contact with the inner cells taken about one-third below the apex.

Fig. 11.—*Bryum proliferun* (L.) Sibth., about natural size.

Fig. 12.—An enlarged capsule.

Fig. 13.—A fragment of the outer peristome.

Fig. 14.—A fragment from inner peristome, showing the two appendiculate cilia and open carinate segments.

Fig. 15.—Leaf somewhat enlarged.

Fig. 16—Tip of leaf highly magnified.

Fig. 17.—Fragment of margin of leaf two-thirds of the way up, showing contact of marginal with inner cells, highly magnified.

Fig. 18.—GRIMMIA PHILIBERTIANA, E. G. BRITTON, about natural size.

Fig. 19.—An old wrinkled capsule considerably magnified.

Fig. 20.—Two ripe plump capsules ; one with straight and other with oblique beak, considerably magnified.

Fig. 21.—The peristome closed, considerably magnified.

Fig. 22.—The peristome open, considerably magnified.

Fig. 23.—Teeth of the peristome more highly magnified.

Fig. 24 —The simple tip of a tooth highly magnified.

Fig. 25.—A leaf somewhat magnified, showing peculiar margin which appears to be double, or in some specimens double near the apex and becoming free to revolute towards the base.

Fig. 26.—Tip of leaf in normal condition highly magnified.

Fig. 27.—Abnormal tip, bearing propagula on the distorted and abnormally situated teeth.

Fig. 28.—Highly magnified cells from near base of leaf.

Fig. 29.—Capsule, old and wrinkled, of *G. Hartmanni*, Schimp., from Corsica. Collected by H. Philibert, July 18th, 1870.

Fig. 30.—Capsule of same moistened, showing peristome closed, somewhat magnified.

Fig. 31.—Tooth from peristome of same, showing the *bifid tip !* considerably magnified.

Fig. 32.—The end of one-half of a bifid tip highly magnified.

Fig. 33.—A leaf somewhat enlarged.

Fig. 34.—The tip of a leaf highly magnified.

Fig. 35.—A fragment showing cells near the base of leaf.

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F. W. ANDERSON, ad. nat. del.

E. G. Britton. Bryum lucidum and Grimmia Philibertiana, n. sp.

Zizania as Found by the Explorers of the Northwest.

By E. J. Hill.

That the wild rice has long been considered a characteristic plant of this region is easily shown by an examination of the writings of the explorers of this country, from those of the French to the latest of Schoolcraft. Those of the French are not at hand, but abundant citations could be made from those of the English and Americans, and few must suffice. Captain Jonathan Carver, (1765–68), speaks of its "great abundance" in the valley of the St. Pierre, (since 1852 the Minnesota) up which he must have gone about 200 miles. Alexander Mackenzie (1789-'93), mentions its "abundance" along the "Grande Portage," the chain of lakes and rivers from Lake Superior to the Lake of the Woods, and the use of it by the Algonquins. He makes the following statement regarding its northward range: "To the north of fifty degrees it is hardly known, or at least does not come to maturity."* Major Zebulon Pike, (1805, 1806), tells of its great plenty about the sources of the Mississippi, and of its sale by the Indians to the fur-traders for their subsistance. In the account of the Lake of the Woods in Major Long's expedition, Prof. Keating, who accompanied the party as geologist and historiographer, writes: "We found in great abundance the plant which bears the wild rice; it was quite ripe at that season.† The Indians collect the grain in great plenty, considering it as one of their best articles of food, and that upon which they can place the greatest reliance. We have been led to make some inquiry as to the extent of the region in which the wild rice grows, and we find it to be very great. Mackenzie says that wild rice is hardly seen, or does not come to maturity, north of the fiftieth degree of latitude, and we believe that it does not grow west of the Mississippi below the mouth of the Missouri, or on any part of this river. Its western extremities are probably about the sources of the St. Peter; it ranges in latitude from the thirty-first to the fiftieth degree, and in longitude from the Atlantic to the ninety-seventh degree."‡

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*Mackenzie's Voyage, London, 1801, p. LXI.

†End of August.

‡L. c. Vol. 2, p. 106.

Schoolcraft was connected with three expeditions to the Mississippi, either as principal or assistant. The volumes he wrote concerning them abound in references to the natural history of the section he traversed, for he was a careful observer. Among these the wild rice finds frequent mention, though least in the account of the journey to the central Mississippi, since the plant did not particularly characterize that region. In the expedition of 1832, when he traced the river to Itasca Lake, and subsequently ascended the St. Croix, he speaks there of the latter river. " Both branches, together with its lower tributaries, and their numerous lakes, yield the northern rice plant. The abundance of the plant has led to the local term of the Folle Avoine country, a name by which it is particularly known in the transactions of the fur-trade."* In the account of the first expedition, when describing the physical characteristics of the Mississippi, and of its origin in a region of lakes, he speaks as follows of its upper waters: " It pursues its course to the falls of Peckagama, a distance of two hundred miles through a low prairie, covered with wild rice, rushes, sword-grass and other aquatic plants."† And in giving what he regards as the most characteristic plant, he continues: " The wild rice (*Zizania aquatica*), is not found on the waters of the Mississippi south of the forty-first degree of north latitude, nor the Indian reed or cane‡ north of the thirty-eighth. These two productions characterize the extremities of the river."§ The range is not strictly correct as to area; it is as to abundance and use of the plant by the Indians. One extract from the remaining volume will show how he looked upon the rice of the lower lakes as compared with that of the Fox River, Wis., which belongs to Lake Michigan, and that of the Upper Mississippi. He came upon it first at the mouth of the Maumee, where now is the city of Toledo, and makes this comparison:

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*Narrative of an expedition through the Upper Mississippi to Itaska Lake, embracing an exploratory trip through the St. Croix and Borntwood or Broulé Rivers. New York, 1834, p. 140.

†Narrative Journal of Travels through the Northwestern Regions of the United States, extending from Detroit through the Great Chain of American Lakes to the sources of the Mississippi River, etc, in the year 1820. Albany, 1821, p. 255.

‡*Arundinaria macrosperma* and var.

§L. c. p. 259.

"Its banks are flat and thickly wooded and conspicuously bordered by aquatic plants. Among them the common bulrush and the wild oat or rice may be noted. The latter plant, to which the natives apply the soft name of monomin*, presents a beautiful aspect when in flower, but it does not attain that luxuriant growth which we have observed near the sources of the Mississippi and along the shores of the Fox River, so abundant in this native grain. * * In ordinary seasons the quantity which is gathered in certain parts of Michigan† and Hudson's Bay Territories is truly surprising. We are informed by Mr. Harman that at a single post on Rainy Lake, the Northwest (now Hudson's Bay) Company purchased from the natives an annual supply of twelve or fifteen hundred bushels, and it constitutes a principal article of food at the trading posts in that quarter."‡ And I may add that Carver alone did not find the plant of the lower lakes equal to that farther west. He devotes the last chapter of his volume to the plants which attracted his attention, especially those of use to the Indians, and says of the wild rice: "I found great quantities of it in the watered lands near Detroit, between Lake Huron and Lake Erie, but on enquiry I learned that it never arrived nearer to maturity than just to blossom, after which it appeared blighted and died away."§ This he ascribed to climatic conditions that the present experience of fruit growing and agriculture in Michigan would hardly warrant. Whether the condition was temporary or still holds would be well to verify, since it seems to have been well-marked at the time.

From these extracts and observations it appears that the wild rice, though plentiful and known to have been gathered by the Indians in the regions between Lake Huron and Lake Michigan, as well as elsewhere, had its principal field in the country west of Lake Michigan, in Wisconsin, Minnesota and a part of the Hudson Bay Territory. Of this, but a comparatively small part was tributary to Lake Superior and Lake Michigan, the Fox River Valley being the chief one. And nearly all the region of Indiana and Illinois, though much less abundant in the production, must be added. I have been thus particular regarding this plant, not alone to correct any error that may have arisen concerning it, but to bring together some facts concerning a state of things that has largely passed away, or will soon be of the past, like the Indians who once were in power here. Those still gather the grain who live in the region of the Upper Mississippi and the Red River, and perhaps some scattered communities in Wisconsin. I saw some of it in 1889 at Vermilion Lake, where a few of them still reside; soon, however, it was said, to move elsewhere.

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*Chippeuay.

†Michigan Territory then embraced the region of the Upper Mississippi, or at least was governed from Detroit after 1818.

‡Travels in the Central Portions of the Mississippi Valley. Performed under the sanction of Government, in the year 1821, by Henry R, Schoolcraft. New York, 1825, pp. 20, 21.

§Travels through the interior parts of North America in the year 1766, 1767 and 1768, by J. Carver, Esq., 3d Ed., London, 1781, p. 525.

A New Locality for Lychnis Floscuculi, L.

The last edition of the Manual gives the range of this plant as New England and New York. It is but sparingly established in New York, however. Dr. Watson informs me that it was collected at Old Chatham, N. Y., in 1888, by C. E. Faxon. This is the only place in the state at which I can learn of its having been found until last season ; it was collected by my brother at Irvington on the Hudson. The station is at the Irving grounds, just north of Irvington. Quite a number of specimens were found growing in the edge of the lawn near the entrance to the grounds. The frequent mowing of the lawn had kept them from becoming very numerous ; but farther north and directly west of the house, there is a strip of waste land bordering the Irving grounds on one side and the Hudson River Railroad on the other. Here the plant was found growing quite abundantly. How it became established here is uncertain. It may possibly have been cultivated on the grounds at some former time, or its proximity to the railroad may account for it.

However this may be, it seems to have thoroughly established itself at this place. CORNELIUS L. SHEAR.

Botanical Note.

The Botanical Society of Western Pennsylvania have issued their Calendar for 1890-91. This little pamphlet contains a brief history of the organization, its proposed dates of meeting, list of members, books in the library, etc. The officers for the present year, beginning last October, are President, Prof. J. W. Caldwell; Vice-President, Rev. H. R. Johnson; Corresponding Secretary, Prof. J. G. Ogden; Recording Secretary, Miss W. L. Matthews; Treasurer, C. C. Mellor; Curator, John A. Shafer.

Reviews of Foreign Literature.

A New Theory of the Process of Growth of the Plant Cell.—In the "Berichte der Deutschen Bot. Gesellschaft" for August, 1890, pp. 196, is an article by Dr. Julius Wiesner entitled, "An Attempt to Explain the Growth of the Plant Cell." The writer states that most botanists assume that the growth of the cell and its parts takes place by means of intussusception; others discard this theory entirely and claim that the method is that of apposition; still another class try to harmonize known facts by a combination of the two theories, namely, that both methods of growth occur. Then follows a brief statement of an explanation which is entirely independent of the much-vexed question of intussusception or apposition.

This theory, if substantiated, would lead to an over-throw of several other long cherished opinions respecting not only the manner of growth of the cell but the nature of the substance composing it, and is altogether of such a revolutionary character as to warrant an almost literal translation of the article referred to.

In his explanation he first shows the analogy between growth in general and that of the smallest part of the organism; for example, the growth of an organ, leaf or stem, takes place by an increase in volume coming from the extension of a whole or part of its cells. There may be unequal development, one part growing faster than the other, but the whole organ gets its shape, size, etc., from the growth of the cells composing it. Now the cell growth is similar to this, in so far that it is accomplished by the parts composing it. Without any apparent shoving or displacement, it grows in surface, in length, and in thickness, the growth always preserving the intercalary nature of all new formation. This very idea of intercalary growth led to the notion of intussusception. This analogy between the processes of growth in an organ and that of the cells composing it, is not merely external. All scientists agree that no living substance can originate from a dead one. That is, inside the organism all living substance must come from living. This is the first assumption or premise on which is founded the new theory.

In order to avoid misconception here, he explains, that in the process of assimilation, in its widest sense, dead substance becomes a part of living, but that this can happen only in the presence, and by the aid of living matter, so in this sense there is no objection to the hypothesis as above stated.

The second assumption is, that no other method of new formation occurs in an organism except that of division. The cell originates from the division of a cell; the same is true of the nucleus, also of the chlorophyll-grain or that from which it springs, etc., etc. The process of division is found to be so intimately connected with all living things as to lead to the conclusion that it also plays a part in processes so obscure as to be hidden from our observation. This hypothesis is closely connected with the first. Admitting these two premises we must necessarily admit that protoplasm cannot regenerate itself without a process of inner division. That is, when a meristem cell divides and its parts extend themselves, the substance being increased, this new formation is the result of the inner division of the protoplasm. Therefore the living substance of the plant, and to this is reckoned not only the cytoplasm, nucleus and similar structures, but also the cell-wall, must consist of little organized individuals having the power to divide themselves. They must also have the power to grow, else they would cease to be organized; having the power to grow implies the power to assimilate. Therefore the conclusion, "Living substance consists of small organized individuals, having the power to divide, to grow, and to assimilate."

These smallest portions of the organism he names *Plasomen*, and says in reference to their union with one another, it may be of various kinds, but probably in most cases they are so united that each is in contact with water. Now if the cell and its living parts are composed of these plasomes, as a leaf is composed of cells, then the growth of the cell must result from the growth of its plasomes, just as the leaf or other multicellular organ grows by the volume increase of its cells.

The question how these plasomes grow, after division takes place, is answered as follows: As the masses they compose possess a large quantity of water, they are easily moved upon each other, therefore the process of intussusception is not necessary to cause their increase in volume. This increase, in case of a plasome which has just divided, may be explained in a purely physical manner. By diffusion and absorption, water holding solid substance in solution enters these little bodies and is assimilated; in this way the solid matter of the product of assimilation fixes the volume of the plasome.

The only question unanswered by this hypothesis is, "How does the dead substance, which posesses a certain molecular structure, become a part of the living unit in such a way that after a certain time it no longer posesses this structure but is an integral part of the living unit, and division again occurs?"

Just as the molecule is the final form element of lifeless matter, so is the plasome the final form element of living organism. All the processes of division occurring in the cell depend on this ability of the plasome to divide; for example, if a chlorophyll grain divide, it is not by the simple process of a part of the plasomes separating from the remaining portion, but by a sing lelayer of these units dividing.

But the growth of the protoplasm must be distinguished from that of the plasome; the latter, by growth, simply makes good its former volume, while the protoplasm grows by the increase in number of its plasomes.

This theory of the manner of growth does not exclude the notion of increase in volume by the stretching caused by pressure.

The foregoing, while not a literal translation, gives nearly the whole of this paper of Prof. Wiesner, which he says contains in brief the conclusions reached by several years of study, and while it may be regarded as an effort to consider the question of cell-growth from a new stand point, it is more especially an effort to make clear those points about which converge the new discoveries about the life and development of the cell, and particularly the meaning of the processes of division.

In the foregoing article only the questions relating to the manner of cell growth are considered, and of these the principal ones are so familiar as to need no explanation in regard to the application of the theory here set forth. In a foot-note the author says: "The act of conjugation does not refute the principle that all new formation takes place by division, as before this can occur, new cells are formed by division."

This naturally suggests another application than that made by Prof. Wiesner. The reviewer may perhaps be pardoned for briefly stating this possible application, as it seems to follow as a natural consequence of the new theory.

If this new method of growth be applied to that of reproduction, a reason is found for various facts not hitherto explained. Admitting that the process of growth consists of a division of the plasome and a subsequent increase in size by the assimilation of lifeless matter, may not the process of reproduction resemble this, except that the two halves of the divided plasome unite with the halves of other units? Thus in the case of conjugation, fusion of the two masses would mean, not simply a mingling of the micellaé of the protoplasm of different cells according to the present theory, but first, a division of the plasomes of both masses, then a reunion, such that the halves of the protoplasm of one cell would unite with those of the protoplasm of the other cell. This represents the highest form, or that found in the highest plants. Next below this may be assumed the process known as rejuvenescence, a cell throws off its wall, the protoplasmic plasomes divide, then reunite, each half with that of another unit, a new wall is formed and the life processes of the original cell are repeated.

Following this in the downward scale comes the process known as asexual spore production. The plasomes of a part of the protoplasm of a cell divide, reunite as in the latter case, and thus become endowed with a new energy and have the power to germinate into a new plant. Below this comes the form of reproduction which is nearest to growth and in many cases difficult to distinguish from it, viz.: vegetative reproduction, division of masses without the union of divided plasomes with each other.

E. L. G.

Second Systematic Census of Australian Plants, with Chronologic, Literary and Geographic Annotations. By Baron Ferdinand von Mueller. (Part I. Vasculares, 4to, pp. 244. Melbourne, 1889).

This is a systematic enumeration of all species of flowering plants and Pteridophyta, known at the present time to inhabit Australia. The sequence of orders is somewhat different from those used by other recent authors; Baron Mueller dividing the Dicotyledonæ into (1) Choripetaleæ Hypogynæ, (2) Choripetaleæ Perigynæ, (3) Synpetaleæ Perigynæ, (4) Synpetaleæ Hypogynæ, (5) Apetaleæ Gymnospermæ. This grouping does away entirely with the artificial class Apetalæ. The Monocotyledonæ are divided into (1) Eucalyceæ Perigynæ, (2) Eucalyceæ Hypogynæ, (3) Acalyceæ Hypogynæ. The total number of species listed is 8839.

N. L. B.

Recent Research among Fossil Plants. M. de Saporta. Rev. gen. de Bot. II, 1890.

In a recent number of Nature, (Sept. 25th, 1890), J. Starkie Gardner gives a review of the above which reads as follows;— It appears that mosses were almost certainly represented in the Palæozoics, a species allied to *Polytrichum* having been discovered at Commentry in France. Rarely as the fructification of ferns is preserved in the coal-measures, twenty species are now investigated, confirming the view that the Palæozoic species differed widely from the present, the vast order Polypodiaceæ and the Cyatheæ being unrepresented. The view that the *Calamarias* were in part Gymnosperms is all but universally abandoned, and the close affinity of the *Lepidodendrons* and *Sigillarias* and their cryptogamic nature everywhere admitted. Links in the chain of evolution between Cryptogams and Gymnosperms still elude our search, and the earliest vegetation of which we have any complete knowledge already presents well-developed Gymnosperms in the shape of the deciduous *Cordaites*, a few *Cycads* and obscure *Taxads* allied to *Ginkgo*.

Index to Recent Literature Relating to American Botany.

Abies concolor. (Gard. Chron. viii. 748, figs. 147-151).

Achyronychia—A New. T. S. Brandegee. (Zoe, i. 230, 231). *A. Rixfordii*, from Inyo Co., Cal.

Actæa—Remarks on the Genus. Edward L. Greene. (Pittonia, ii. 107-109).

Professor Greene maintains that we have three species of Baneberry in North America, all distinct from the Old World *A. spicata.* They are (1) *A. alba*, Mill, Gard. Dict. Ed. 8 (1768) which name has commonly been attributed to Bigelow. (2) *A. rubra*, Willd, and (3) *A. viridiflora*, a new species from the pine and spruce woods of the San Francisco Mountains, Arizona, first collected by Dr. Rusby and more recently by Prof. Greene.

N. L. B.

Agave Americana. (Garden, xxxix. 12, illustrated).

Basket-work of the North American Indians—I. V. Havard. (Garden & Forest, iii. 619, 620).

Basket making is one of the most extensive of the Indian handicrafts and it is natural that they should employ to the utmost such material as happens to be available. Taking the whole of North America as a range, the variety of material is necessarily considerable and in this first contribution to the subject the author mentions specifically six grasses, seven willows, three poplars, the rootlets of *Alnus rhombifolia*, *Rhus aromatica*, var, *triloba*, *Apocynum cannabinum*, bark of *Ulmus Americana*, shoots of *Cornus sericea* and *Vitis Californica.*

Biologiske Optegnelser om Groenlandske Planter. Eug. Warming. (Bot. Tidsskrift, xvii. 202-227, illustrated).

This is an account of detailed biological observations on Greenland plants, the present installment relating to the Scrophulariaceæ and especially to species of *Veronica*, *Pedicularis*, *Rhinanthus* and *Bartsia.*

Cañaigre (*Rumex hymenosepalus*). H. H. Rusby. (Drug. Bull. Nov., 1890, illustrated; reprinted).

Cattleya Walkeriana. St. Paul Hilaire. (Gartenflora, xxxviii. t. 1299).

Native of Brazil.

Cottonwood from Baja California. T. S. Brandegee. (Zoe, i. 274, 275).

Populus monticola described as new.

Cypripediums longifolium and Lowi. (Gard. Chron. viii. 728-730, figs. 143, 144).

Echinopsis cristata, Salm. H. Hildman. (Gartenflora, xxxviii. 286-288, one figure).

A Bolivian Cactus.

Ein Ausflug nach der Serra de Caparao (Staat Minas, Brazilien) nebst dem Versuche einer Vegetationsskizze der Dortigen Flora. W. Schwanke. (Engler's Bot. Jahrb. xii. Beiblatt nr. 28, 4-10).

Fungus Diseases of the Sweet Potato—Some. Byron D. Halsted. (Bull. No. 76, N. J. Agric. Exp. Station, Nov. 28, 1890, illustrated).

Black rot (*Ceratocystis fimbriata*); Soft rot (*Rhizopus nigricans*); Soil rot (*Acrocystis batatas*); Stem rot, White rot (*Phoma batatæ*); Sweet Potato Scurf (*Monilochætes infuscans*); Leaf blight *Phyllosticta bataticola*) and Leaf mould (*Cystopus IpomϾpanduratæ*) are described and figured.

Index to Volumes vii-xvi Bulletin of the Torrey Botanical Club. Compiled by Elizabeth G. Britton. (Pamph. 8vo. pp. 31, New York, 1890).

List of the Plants of Ohio—Supplementary. Wm. R. Lazenby and W. C. Werner. (Pamph. 8vo. pp. 10, Ohio State University, Columbus, Ohio, Dec., 1890).

In this neatly printed and carefully edited pamphlet the authors state that it "is published for the purpose of showing what additions have been made to the last published catalogue," but they fail to say to what catalogue they refer. Among the various sources from which their information has been obtained, they fail to mention the "Catalogue of the Flowering Plants and Ferns of Ohio," by J. S. Newberry, published in 1860, and we infer that they have not seen it, inasmuch as about a dozen of their "additions" are mentioned in that work. Amongst these we note *Nymphæa odorata, Geum rivale, Myosotis laxa, Lophanthus scrophulariæfolius, Quercus prinoides, Smilax glauca* and

Carex cephalophora. The actual number of additions amongst the Phanerogams is 164 and of the Cryptogams 16, nine of which are Musci and seven Hepaticæ. The nomenclature adopted is that of the revised edition of Gray's Manual. In nearly every instance localities are given and also the name of the persons credited with the discovery. The authors promise a complete catalogue in the near future and invite all botanists to assist in the work, with which invitation we have endeavored to comply.

A. H.

Lobelia laxiflora, H. B. K. L. Wittmack and C. Græbener. (Gartenflora, t. 1301 and figures).

Loco-Weeds—Chemical Examination of Some. F. B. Power and J. Cambier. (Pharm. Rundsch. ix. 8-12, illustrated).

Astragalus mollissimus and *Crotalaria sagittalis* are discussed and the latter is figured.

Missouri Botanic Garden. Wm. Trelease. (Cloth, 8vo., pp. 165, illustrated, St. Louis, Mo., 1890).

In this volume we have a compendium, to date, of everything concerning the Missouri Botanic Garden. The preface tells us that it was prepared at the request of the Board of Trustees and the result must certainly be gratifying to them. A biographical sketch of Henry Shaw, with portrait, is the fitting prelude, after which follow copies of the legislative act which enabled Mr. Shaw te devise or convey his lands to trustees in accordance with his intentions; his will establishing the garden; the deed to Washington University, endowing the school of botany; an account of the inaugural exercises in Memorial Hall, Nov. 6, 1885; the first annual report of the Director for 1889; the report on the School of Botany, submitted June 3, 1890; the first annual flower sermon, by Rev. Daniel S. Tuttle, delivered in accordance with the provision of the will for the preaching of an annual sermon upon "The wisdom and goodness of God, as shown in the growth of flowers, fruit and other products of the vegetable kingdom," and the proceedings at the first annual banquet, May 26, 1890, under the provision of the will, which says: "I hereby bequeath one thousand dollars annually for a banquet to the trustees of the garden, and to the guests they may invite, literary and scientific men and friends and patrons of the natural sciences; to be paid each year out of the funds devised for the support of the Garden." The illustrations include a map of the grounds, pictures of the buildings and characteristic scenes in parts of the garden. The plates, typography and general make-up leave nothing to be desired and we trust that this volume may be followed by many others of a similar character. A. H.

Monocotyledonen—Drei neue. R. A. Philippi. (Gartenflora, xxxviii. 369-371, t. 1302).

Latace is a proposed new genus of Liliaceæ, with a single species, *L. Volckmani* from the Andes of Santa Rosa, Chili; *Tillandsia Geissei*, from Caldera, and *Stemmatium narcissioides*.

Myrtaceæ ex India Occidentali a Dominis Eggers, Krug, Sintenis, Stahl aliisque collectæ. Hjalmar Kiaerskou. (Bot. Tidsskrift, xvii. 248-292; illustrated by seven plates and numerous wood-cuts).

An enumeration of the recently collected Myrtaceæ from the West Indies. New species are described in the following genera: *Calyptranthes*, *Marliera*, *Myrcia*, *Eugenia*, *Myrcianthes*, *Anomomis*, *Calyptropsidium*, *Myrtus* and *Marlieropsis*, a new genus with a single species, *M. Eggersii*, collected by Baron Eggers in Santo Domingo (No. 1,061). It is a very important paper, and illustrates how much is to be done in elucidating the West Indian flora. Altogether fifteen new species are characterized, mainly from Santo Domingo, Jamaica and the Bahamas.

Nomenclature and its Amenties. H. W. Harkness. (Zoe, i. 275, 276).

This is a memorandum on the recent argument between the editor of the BULLETIN and Mr. James Britten regarding the use of the generic name *Tissa* instead of *Buda* for the plants more commonly known under *Spergularia* or *Lepigonum*. The writer agrees with Dr. Britton, but is plaintive over the attitude taken by him, and complains of being driven. This we sincerely regret. A curious statement, illustrating want of research on the part of our critic, is that the name *Micrampeles*, Raf.—the old generic name for *Echinocystis* and *Megarrhiza*—has never yet been recognized by any one outside of the Torrey Club. We were not aware that Mr. James Britten and Prof. E. L. Greene were active members of the club, yet if reference be made to the Journal of Botany and to Pittonia, ii. 127–129, such recognition may readily be found.

Notes concerning the Collection of Plants made by Xantus at Cape St. Lucas and Vicinity. T. S. Brandegee. (Zoe, i. 269–272).

Notes on North American Trees—XXI, XXII. C. S. Sargent. (Gard. and For. iv. 4; 15-6).

The author considers that the plant frequently referred to as *Myginda integrifolia*, Lam., differs so essentially from the other species of the genus as to deserve a distinct generic rank, and *Gyminda* is proposed—the name of a section of *Myginda* established by Grisebach for it. He also states that the specimen upon which Lamarck founded his species, now in the museum at Paris, proves to be *Rhamnus ferrea*, Vahl., so that *Myginda integrifolia* must be relegated to the position of a synonym for that plant, and the name *Gyminda Grisebachii* is proposed for its name in the future. *Reynosia latifolia*, Griseb., is the subject of a brief note in which the author says that if its reference to the *Rhamnus lævigatus* of Vahl, or *Ceanothus lævigatus* of DeCandolle, could be more satisfactorily established we should have to know it as *Reynosia lævigata.* The identity of these plants he, however, regards as doubtful, and hence retains *Grisebach's* name. In regard to *Condalia ferrea*, Griseb., he states that it has been referred to no less than six genera, in neither of which it seems to belong, and proposes to place it in the genus *Rhamnidium*, so that its name will become *R. ferreum.*

Notes on some Phanerogams of Central Minnesota. Conway MacMillan. (Bot. Gaz. xv., 331–334).

Brasenia peltata is noted from the northern part of the State, where "apparently it excludes from these waters the white water lily * * and tends to drive out the common pond lily." * * *Arenaria patula* and *Myriophyllum ambiguum* var. *limosum* were found in Cass County, and *Utricularia gibba* in Irving Chase Lake, all three reported as new to the State. *Liatris cylindracea*, as it occurs near Brainerd, diverges so remarkably from the type that a new variety is proposed and described, var. *solitaria.*

Oaks—Notes on Western. Edward L. Greene. (Pittonia, ii. 111–114).

Remarks on *Quercus Jacobi*, *Q. pungens*, *Q. turbinella* and *Q. agrifolia.*

Palmetto of the Southern States. W. P. Wilson. (Forest Leaves, iii. 53-54, one plate).

Description of *Sabal Palmetto* illustrated by a reproduction of one of Professor Wilson's capital photographs. There are allusions to other palms as well.

Peronosporeæ for 1890—*Notes upon.* Byron D. Halsted. (Bot. Gaz. xv. 320-324).

Potato Scab : a Bacterial Disease. H. L. Bolley. (Agric. Sci. iv. 277-287 ; Pl. iii. iv.)

Platystemon and Eschscholtzia—The Variations of. Katharine Brandegee. (Zoe, i. 278-282).

Ranunculus—Notes on. Edward L. Greene. Pittonia, ii. 109-110).

Notes on varieties of *R. subsagittatus* and *R. affinis ; R. ellipticus* is described as new.

Reprint of Fraser's Catalogue. Edward L. Greene. (Pittonia, ii. 114-119).

Professor Greene has done botanists a valuable service in reprinting this old pamphlet, thus putting it within reach of everybody. The original is extremely rare. It was published in London in 1813, compiled by Thos. Nuttall. Its full title is "A Catalogue of New and Interesting Plants collected in Upper Louisiana and principally on the River Missourie, for sale at Messrs. Fraser's Nursery for curious American Plants, Sloane Square, King's Road, Chelsea, London." Professor Greene points out that *Yucca glauca* of this catalogue antedates *Y. angustifolia*, and *Dalea enneandra* antedates *D. laxiflora*, Pursh., and that *Sideranthus* is older than either *Chrysopsis* or *Aplopappus.* The copy is taken from the pamphlet preserved in the library of the Philadelphia Academy of Natural Sciences which belonged to Zaccheus Collins. N. L. B.

Root-tip—The. F. S. Sargent. (Pop. Sci. Monthly, xxxviii. 31-40, illustrated).

Simaruba Tulæ, Urban. Ign. Urban. (Gartenflora, xxxviii. t. 1298).

Native of Porto Rico.

Station Botanists at Champaign. Byron D. Halsted. (Bot. Gaz. xv. 334-339).

An account of the meeting of the Association of Agricultural Colleges and Experiment Stations.

Thismia Glaziovii, n. sp. V. A. Poulsen. (Overs. Kong. Danske Vidensk. Selskabs Forhand. 1890, 18-38, Plates II-IV).

Triuris major, sp. nov. et Bidrag til Triuidaceernes Naturhistorie. V. A. Poulsen. (Bot. Tidsskrift, xvii. 293-306; one plate).

Description of a new species of this interesting saprophytic genus, collected by Dr. Glaziou in Brazil, with a general discussion of the order.

Tubulina cylindrica and Allied Species of Myxomycetes—Notes on the Development of. Geo. A. Rex. (Bot. Gaz. xv. 317-320).

Uncinula spiralis, B & C.—Note on the Nomenclature of.—B. T. Galloway. (Bot. Gaz. xv. 339).

Variability in the number of Follicles in Caltha. T. D. A. Cockerell. (Nature, xlii. 519).

A tabulated series of observations on *Caltha leptosepala*, D.C. is given, in which the number of follicles varied from two to fifteen, the odd numbers being more common than the even and the total number of plants examined being seventy-five.

White Oak—The. (Gard. and For. iv. 1, 2, figs. 1 and 2).

This is another of the excellent popular descriptions of our common forest trees which have appeared from time to time in this publication. Typical examples of the species in each instance have been chosen, and the representations have been uniformly so good that they deserve more than a passing mention. The *Quercus alba* which illustrates this article is shown in its full summer foliage, and also as it appears in winter, with naked branches. We wish that more of our trees were figured in the same manner, so that the characteristic branching of each could be emphasized, often an important feature.

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EDITED BY

NATHANIEL LORD BRITTON,

AND OTHER MEMBERS OF THE CLUB.

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BULLETIN

OF THE

TORREY BOTANICAL CLUB.

Vol. XVIII.] New York, March 10, 1891. [No. 3.

A Study of the Apical Growth of the Prothallium of Ferns with Reference to their Relationships.

By Douglas H. Campbell.

(Plate CXV.)

In January of last year I published in the Botanical Gazette* a paper on the affinities of the Filicineæ suggested by a similar one by Bower† in the Annals of Botany, the object of my paper being to defend the older theory of the origin of the ferns from the Hepaticæ, as opposed to the later theory of Bower‡ and others that the ancestral forms of the pteridophytes were alga-like forms similar to the filamentous prothallium of certain Hymenophyllaceæ which are regarded as the most primitive of living Filicineæ.

Having been engaged for some time past in the further study of this problem, a number of facts have been collected which may serve to throw some further light on this most interesting question.

As is well known, the prothallium of most ferns bears a most striking resemblance to certain thallose liverworts,—indeed, so striking is the resemblance that sometimes a miscroscopic examination is necessary to distinguish them, and when the prothallia remain unfertilized they may reach a size considerably surpassing many of the smaller liverworts.§

In its earlier stages the young fern-prothallium usually grows

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* Campbell—On the affinities of the Filicineæ. Bot. Gaz. Jan. '90.

† Bower—The Comparative Examination of the Meristems of Ferns as a Phytogenetic Study. Annals of Botany.

‡ Bower—l. c. p. 386.

§ Goebel—"Outlines." p. 199.

by means of a single two-sided special cell, which is often established very early (See Fig. 1-a), and may persist until the prothallium has reached a considerable size. This cell has two sets of segments cut off from its sides, by walls which are parallel to the latter. This regular succession of segments is usually conspicuous and the limits of the individual segments are often recognizable for a long time (Fig. 2). Sooner or later the apical cell is divided by a wall at right angles to the axis of the prothallium into a marginal cell, four-sided when seen from above; and an inner triangular cell (Fig. 6). The former of these next divides in most cases by a longitudinal wall into two equal cells, but in some cases observed (in *Osmunda cinnamomea*) the single four-sided cell may persist for a time as a single apical cell. (Figs. 4, 5).

All of these points are readily made out from surface views of the prothallium, and with the exception of the last mentioned, have been repeatedly observed and recorded by numerous writers; but the fact that in the later stages of the apical cell (or cells), there is a perfect regularity in the succession of segments cut off, seems to have entirely escaped the attention of these investigators. Kny* it is true, figures, in the main correctly, a longitudinal section of the prothallium of *Osmunda regalis*, showing the apical cell and its younger segments; but makes no reference to having detected any regularity in the arrangement of the cells, simply stating that walls are formed parallel to the surface of the prothallium, thus giving rise to the thickened midrib characteristic of the prothallium of the Osmundaceæ.

When we compare the process of growth here briefly outlined with that of the thallose liverworts, we cannot but be struck with the remarkable resemblances—nay, identity in many cases—of the two.

The liverworts have been repeatedly and carefully studied, especially by Leitgeb, and in his magnificent work† upon them, we have ample means for comparing their development with that of the fern-prothallia. Recently also, Kny‡ has published an account of the structure and development of *Marchantia* which shows also some remarkable resemblances to the growth of the fern-prothallium. So often, indeed, in comparing the liverworts with the fern-prothallium, do we meet with the same structure and method of growth, that such extraordinary correspondence of structure, without a corresponding relationship, seems impossible.

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* Kny—Entwickelung des Vorkeimes von *Osmunda regalis*. Pl. II. fig. 2.

† Leitgeb—Untersuchungen ueber die Lebermoose. 1874–1881.

‡ Kny—Bau und Entwickelung von *Marchantia polymorpha*, 1890.

Of the liverworts known at present, the thallose Jungermanniaceæ and certain Anthoceroteæ approach most nearly in structure in their mature condition, to the fern-prothallium. In the former, according to Leitgeb* there is always a single apical cell so that these plants show throughout their life a condition which is usually but transitory in the fern-prothallium. In such forms as *Metzgeria* too, the structure of the thallus is essentially the same as the prothallium of the Osmundaceæ.

In *Metzgeria* and *Aneura*† as well as other related genera, the apical-cell is of the two-sided form and the succession of segments same as in the fern-prothallium. In *Pellia*‡ it corresponds closely in form to that shown in Fig. 4, 5, and probably represents a higher degree of development.

In the Anthoceroteæ§ there seems to be at the growing points of the full-grown thallus a row of similar cells, much as in the full-grown fern-prothallium. Whether this is preceded by a single apical cell in the young plant is uncertain, as our knowledge of the germination of the spores is limited to that of the genus *Anthoceros*,‖ and this point does not appear to have received the attention it deserves.

The Marchantiaceæ** and Ricciaceæ,†† correspond closely in the structure and growth of the thallus, and all, so far as is known, have at the growing point a row of similar cells, cutting off two sets of segments above and below. The germination of the spores in the latter group is known only in *Riccia glauca*, and according to Leitgeb‡‡ is entirely similar to that of the

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* l. c. Vol. III. p. 6.
† Leitgeb, l. c. Vol. III. p. 40. Pl. I. II.
‡ Leitgeb, l. c. Vol. III. p. 7, 53. Pl. III.
§ Lietgeb, l. c. Vol. V. p. 13. pl. I.
‖ l. c. p. 29.
** Leitgeb, l. c. Vol. VI. p. 2.
†† l. c. Vol. II. p. 16. Pl. IX.
‡‡ l. c. p. 23.

Marchantiaceæ investigated. Unfortunately I have been unable to find an account of the details. Of the Marchantiaceæ *Marchantia* has been the subject of a recent work by Kny already cited. This latter is especially interesting, as it shows that in its development the young thallus follows step by step, precisely the same course described in the young fern-prothallium*. First the protonemal filament; next oblique walls cutting off a *single two-sided apical cell;* this is then divided by a transverse wall, and the inter cell, by longitudinal walls becomes transformed into the row of marginal cells that characterizes the growing point of the older thallus.

Owing to their extreme delicacy, it is almost impossible to make satisfactory longitudinal sections through fern-prothallia without imbedding them. It is no doubt for this reason that no satisfactory account of the cell-division in the apex, subsequent to the formation of the thickening back of it, has been given. It is possible, however to imbed them in paraffine and it is then a simple matter to make very thin sections which show every detail of structure with perfect clearness. It is then plainly evident that the divisions are perfectly regular and referable to a type found among the liverworts.

To prepare the specimens for imbedding 1 per cent. chromic acid was used to fix them, and after dehydrating and passing gradually into turpentine, they were placed for several hours in melted paraffine. As a stain, Bismarck brown was the most satisfactory. A solution in 70 per cent. alcohol was used, staining on the slide. In this way the young cell-walls are strongly colored and the preparations show every detail with the utmost sharpness.

SPECIAL INVESTIGATIONS.

Sections were made of the prothallia of *Onoclea sensibilis* and *O. Struthiopteris*, as well as a number of undertermined Polypodiaceæ, and of *Osmunda cinnamomea*. In all of these a strong resemblance was observed.

In the larger prothallia of the Polypodiaceæ, so far as observed, the growing point consists of a row of several cells, (Fig. 3, a, a^{I}, a^{II}), each one nearly four-sided as seen in sections parallel with the surface of the prothallium. These divide oc-

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* Kny, l. c. pp. 387–389. Fig. xc.

casionally by longitudinal walls and thus add to the number of marginal cells of the prothallium; but the further growth of the secondary marginal cells is limited, while that of the apical cells is unlimited. From the bases of the apical cells segments are also cut off, which contribute to the formation of the cushion which bears the archegonia.

Vertical sections of the apical cells are almost perfectly semicircular in form (Figs. 7, 8, a), and comparing this with the surface view, or sections parallel to the surface, we see that these cells are shaped like a flat half-disk. As compared with the other cells they are large, and an examination of the segmentation shows that the divisions occur with great regularity. The segments are cut off by a wall parallel with the inner wall of the apical cell, and reach from the upper surface to the lower one of the prothallium. (Figs. 7, 8). The segment is next divided by a wall at right-angles to the first formed, into two cells, of which the lower one (the upper one in the figure), is slightly larger, and divides more actively than the upper, so that the thickening on the lower side of the prothallium is more marked than on the upper, and results in the formation of the projecting cushion of tissue upon which are borne the archegonia. These seem to bear a definite relation to the segments. After the first division in the young segment, walls are formed in each semi-segment perpendicular to the surface of the prothallium, thus dividing the segment into four cells, two of which are dorsal and two ventral. One of the latter forms at once the mother-cell of the young archegonium. (Fig. 7 ar.).

In *Osmunda* observations were limited to young prothallia that had not yet formed archegonia, but as in this genus there is a thickened midrib traversing the whole prothallium almost from the first, it was to be expected that the method of growth would not deviate very much from that of the Polypodiaceæ. It is not at all infrequent to find in *Osmunda* (*O. cinnamomea*, and *O. Claytoniana*) that the two-sided apical cell of the young prothallium gives place to a single cell from which three sets of segments are cut off—two lateral and one basal. (Figs. 4, 5). In the cases observed this cell was considerably larger than the individual cells of the apex of the other fern-prothallia studied.

The apical cells are longer than those of the Polypodiaceæ, but closely resemble them. (Fig. 9, 10). The segments are cut off from the base in the same way, and the first wall in the segment also divides it into two nearly equal cells, dorsal and ventral. The subsequent divisions, at least in the younger prothallia, are less regular and there is a preponderance of horizontal walls. (Figs. 9, 10). The difference in the rapidity of cell-division in the dorsal and ventral segments is not noticeable. How this may be in the older prothallia, and what the relation of the archegonia to the segments is, I cannot yet state, but hope soon to have an opportunity of examining this point carefully.

When we compare the longitudinal sections of the prothallia with those of the liverworts, we find that most of the latter differ in one marked respect—viz: that two sets of segments are cut off from each apical cell (when seen in vertical section), a dorsal and a ventral one. This seems to be the case in all Marchantiaceæ* and Ricciaceæ†, and in *Anthoceros*‡; but in *Dendroceros*§, a near relative of the latter, we meet with exactly the same form as in the ferns (Fig. 11); and the single apical cell of *Pellia epiphylla*,‖ according to Leitgeb's account is also of the same type, although the nearly related *P. calycina*¶ has an apical cell closely resembling in its method of growth the individual apical cells of the Marchantiaceæ, and according to Hofmeister°, *P. epiphylla* in its earlier stages has the apical cell of the same form, so that the two types must be regarded as closely related, and possibly interchangeable. It is by no means unlikely that further investigation will show both types in the ferns.

Finally, the independent vegetative existence of the fern-prothallia, and the power of multiplication by branching are characters which they have in common with the liverworts, and this is especially marked in the Osmundaceæ, Gleicheniaceæ and Marattiaceæ, just those groups which in other respects approach most nearly the liverworts. In the two former a truly dichotomous branching, apparently entirely similar to that in the thallose liverworts, has been recorded by Goebel[*] and Jonkman.[†]

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* l. c.

† l. c.

‡ l. c.

§ Leitgeb, l. c. Vol. V. p. 30. Pl. II.

‖ l. c. Vol. III. p. 6. 53.

¶ l. c. Vol. III. p. 7. 53.

° Hofmeister, The Higher Cryptogamia p. 23. Pl. IV.

CONCLUSIONS.

From a consideration of the facts presented above, it seems that we are justified in assuming a direct relationship between the Filicineæ and the Hepaticæ. The close correspondence in the development of the two groups, as well as the structure of the thallus in the simpler liverworts, indicates that the two groups have had a common origin, and that the Filicineæ branched off from the liverworts at a comparatively late stage. Probably originating from filamentous green algæ (or possibly flattened forms like *Coleochæte*), the next stage was a delicate heart-shaped form with two-sided apical cell, as in the young fern-prothallium and such liverworts as *Metzgeria* and *Aneura*. A thickened midrib was probably early developed, and in the more differentiated forms the whole thallus became several cells in thickness and in the Marchantiaceæ especially, of considerable complexity.

It is not my purpose to speak of the affinities of the different groups of liverworts here, as that has already been ably discussed by Leitgeb[‡]. It may, however, be well to consider briefly the relative positions of the ferns, as indicated by a comparison with the liverworts. Of the forms that have been investigated, the prothallia of Osmundaceæ[§], and Marattiaceæ,[‖] resemble most nearly such liverworts as *Dendroceros* and *Pellia*, and are probably the most primitive. The Gleicheniaceæ,[○] resemble the Osmundaceæ, in many respects and are in certain ways a connecting link between them and the Polypodiaceæ, with which the Schizæaceæ closely agree. The Polypodiaceæ, with the Cyatheaceæ, form the end of the homosporous series. The Hymenophyllaceæ seem to be degenerate forms, and our present knowledge would indicate that they branched off pretty low down—possibly between the Osmundaceæ and Schizæaceæ.

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[*] Goebel, *Gymnogramme leptophylla*, etc. Bot. Zeit. 1877.

[†] Jonkman, La Generation sexuée des Marattiaceés, p. 208. fig. 57.

[‡] l. c. Vol. VI. pp. 49–53.

[§] Kny, l. c. Luerssen (Schenck's Handbuch p. 171.)

[‖] Jonkman, l. c.

[○] Rauwenhoff, La Generation sexuée des Gleichéniacées.

Our ignorance of the prothallium of the Ophioglosseæ makes it impossible to determine positively their position, but as stated in a previous paper*, there is strong ground for regarding them as the most primitive of all the Filicineæ.

The greatest difficulty, it seems to me, in establishing a direct connection between the liverworts and ferns, is in the different character of the archegonium, and the spermatozoids. The former is very constant throughout all investigated liverworts and differs in some important features from the same organ in the ferns. The spermatozoids too, are different in the two groups, being uniformly bi-ciliate in the liverworts, and multi-ciliate in the ferns. This latter difference I regard as of great importance, and it is much to be hoped that a thorough investigation of this point in the liverworts will be made, to see whether there are forms that deviate from the ordinary biciliate type.

It is by no means impossible that a careful examination of the hitherto unexplored regions of our country, especially the swamps of the Southern States, may bring to light forms which will help to solve the problem of the origin of the Pteridophytes, one of the most important questions, certainly, in systematic botany.

EXPLANATION OF FIGURES.

In all the figures the apical cells are marked a.

Fig. 1. Two very young prothallia of *Osmunda Claytoniana* × 150. Sp-Spore membrane.

Fig. 2. Apex of an older prothallum of the same. The limits of the younger segments indicated by heavier lines. × 150.

Fig. 3. Section of an older prothallium of an undetermined fern (Polypodiaceæ) a, a^{I}, a^{II}. the three apical cells × 300. Section parallel with the surface.

Figs. 4, 5. Two sections parallel to the surface, of prothallia of *Osmunda cinnamomea* with single four-sided apical cell. × 300.

Fig. 6. Surface-view of a prothallium of the same species, showing the transition from the triangular to the four-sided apical cell. × 150.

Figs. 7, 8. Vertical longitudinal section of the prothallium of *Onoclea Struthiopteris*, ar. Young archegonia. × 300.

Fig. 9. A similar section of *Osmunda cinnamomea;* the younger segments are numbered. × 150.

Fig. 10. Apex of a similar section, with the youngest segment still undivided. x 300.

Fig. 11. A similar section of *Dendroceros Breutelii* (after Leitgeb). × 350.

Figs. 1, 2, and 6 are from living specimens; the others fixed with chromic-acid, and sectioned with the microtome.

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* Campbell, l. c. p. 3.

Influence of Moisture upon Dehiscent Fruits.

By B. D. HALSTED and D. G. FAIRCHILD.

(Plate CXVI).

The changes wrought by moisture and dryness upon the dehiscent fruits doubtless assist in the dispersion of seeds in more cases than at first one is willing to grant. A number of the ordinary fruits have been experimented upon by artificially alternating a moist and dry condition, and the results are abbreviated in the following paper.

In experimenting with the fruits it was found necessary to immerse them in a vessel of water in order to get the most marked results, although evident signs of movement were observed when only a moist chamber was used. The dry conditions were generally supplied by the bright sunlight or in case this was absent, by the use of an oil stove.

In the majority of cases examined it will be noted that the hygroscopic movement is much more rapid upon the absorption of water than upon its evaporation from the fruit; but whether there is any advantage in this to the plant, may be a question.

The capsules of *Campanula Americana*, as noticed by Gray in contradistinction to *C. rapunculoides*, have their valves situated near the top, and in dry weather the flaps curl outward and upward, thus allowing free access to the winds which whistle through the openings and whirl out the light, flat seeds. These flaps uncurl and close in from ten to thirteen minutes when placed in water, but require a much longer time to open when placed in warm dry air—the exact time was not noted, but at least fifty minutes are required (Figs. 1-2).

The hard horn-like capsules of *Veronica Virginica* (Figs 3, 4, 5), are examples of a large class of dehiscent fruits, which open and close quite rapidly; that is, fifteen to twenty minutes in closing, and an hour or more in opening. A few examined belonging to this class, are *Syringa vulgaris*, (Figs. 6, 7, 8), *Steironema longifolium*, (Figs. 9-10), and *Viola palmata* var. *cucullata*.

The various species of Viola* as is well known, eject their seeds by the lateral pressure which the valves exert as they fold lengthwise, but in the case of *Claytonia Virginica*, a much more complicated method of expulsion seems to be necessary (Figs. 11-15). The round, flat seeds, six in number, are arranged systematically in the capsule, and as the valves curl inwardly and press against them, the uppermost one (*a*, Fig. 13), is expelled as soon as the pressure becomes great enough. After the expulsion of the first seed, those remaining are arranged again, "loaded" for a second bombardment, and the seed *b* is shot out. In this way the entire number is expelled from the capsule, the last one by the pressure from the sides of the valves. If ripe specimens of this plant be placed in a dry room on sheets of paper, the rattle of the bombardment can be distinctly heard and the floor will be strewn for several feet with the shining seeds. Singular as it may seem in a case of this kind, where so much force is displayed, moisture seems to have little effect upon the capsules when once dried—perhaps because their office to the plant is performed when the seeds are thrown.

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* For an exhaustive account of the minute structure of these opening valves of *Viola*, consult F. Hilderbrand's " Die Schleuderfrüchte und ihr im anatomischen Bau begrundeter Mechanismus. Pringsheim's Jahrbücher für Wissenschaftlichen Botanik, 1873-4, VOL. ix, pp. 235-276, taf. 1-3.

Hybiscus Syriacus, (Figs. 16, 17), has membranaceous capsules, which are retained upon the plant long after the seeds have been blown away, and the wide and rapid variations in the position of the valves make it a most interesting case; in fact, so pronounced are these changes that after a sharp rain the whole aspect of the plant is notably altered. These capsules are representative of a large class of membranaceous seed vessels, of which *Hypericum Ascyron*, (Figs. 18, 19), and *Dictamnus Fraxinella* (Figs. 33, 34), furnish examples. These capsules close when placed in water, in from five to fifteen minutes, varying with the species and maturity of the pods.

The long, soft pods of the *Asclepiads*, if examined upon a rainy day, will all be found closed or nearly so. The movement, although not rapid is quite marked, on account of the large size of the pods.

From its peculiar curled pods *Cassia Chamæcrista*, (Figs. 20, 21), might be expected to show decided hygroscopic movements; if these open or half-open pods are placed in water, they close in five or six minutes. Although exhibiting this rapid hygroscopic movement, the pods possess no explosive power, as in the case of members of the genus *Phaseolus*.

The awns of many grasses, notably those of the *Stipas* and *Andropogons*, twist and untwist with changes of moisture, but those of *Hordeum jubatum*, (Figs. 22, 23), show very marked movements pointing towards the performance of quite a different office. While the movements of the awns of the Andropogons probably facilitate the entrance of the seed into the ground, those of the "Squirrel-tail" simply serve to separate joint from joint of the dry spike, and aid in their transportation from place to place, like a tumble weed. The movement is simply a lateral straightening or backward curving of the awns, which, wedge-like, raises the spikelet from among those below. Moisture has the effect of quickly reversing the process.

Similar to the last are the movements made by the pappus of numerous species of Compositæ. A sprig of *Solidago Canadensis*, some days past blooming, was placed among others in a glass of water and in five minutes the involucres, which were open as at Fig. 24, had closed in upon the achenia and pappi so completely as to make it almost a matter of doubt if the sprig was the same (Fig. 25). Upon exposure to the dry atmosphere for an hour or so, the involucres opened, and the achenia were soon seen to separate from the receptacle and mount upon each other by the force of the expanding pappus.

The heads of *Brunella vulgaris* are susceptible in a high degree to the changes of moisture. In dry weather the calices with their short pedicels stand closely appressed to the main stem, (Fig. 26), while in wet weather, they bend outward and even downward, (Fig. 27), giving the head a loose, bushy appearance quite different from its aspect in a dry atmosphere.

Upon examining the heads of the common Bergamot (*Monarda fistulosa*), it was found that the dry, tubular calices, which are arranged on branches or arms radiating from the center, are almost always split open at their bases (Fig. 28). At first this almost universal splitting of the calyx, together with the presence of the chinks in the floor of the head, were taken as indicating a regular mode of seed distribution; but further examination showed it to be only a secondary mode at most; the primary one is through the hairy throat. The force which raises the seeds from the bottom of the calyx is centrifugal, created by rapid spring-like movements of the stiff flower stalks; and on any windy day if numerous heads be examined, seeds may be found wedged among the stiff hairs of the calyx throat, unable to escape. These bristles are capable of rapid hygroscopic movement (Figs. 29-30).

While searching for examples of seed distribution, attention was called for the first time to the richly endowed disbursive powers of *Polygonum Virginianum* (Figs. 38–43). The two long reflexed styles of this plant, which are notably persistent, are extremely elastic when dry and at the same time arranged in such relations to each other, that they form an inverted wedge-shaped space capable of holding, when once inserted, the hair of any passing animal. If slight pressure is brought to bear upon the under side of these strong, persistent styles, the seed suddenly separates from its pedicel and flies to the distance of several feet from the plant. The seed in its passage through the air follows a continuous path without revolutions on its own axis.

DESCRIPTION OF FIGURES. (Plate CXVI.)

No. 1. *Campanula Americana.* Dry.
No. 2. The same thirteen minutes after immersion in water.
No. 3. *Veronica Virginica.* Dry.
No. 4. The same moistened.
No. 5. View from above of dry capsule.
No. 6. *Syringa vulgaris.* Dry.
No. 7. The same moistened.
No. 8. Side view, showing seeds *a*.
No. 9. *Steironema longifolium.* Dry.
No. 10. The same fifteen minutes after being placed in water.
No. 11. Green pod of *Claytonia Virginica*, seen from above.
No. 12. The same dry, after seeds have been thrown.
No. 13. The pod ready for dispersion of seeds: *a*, *b*, and *c*, seeds first, second, and third, in order of expulsion.
No. 14. Side view of pod after expulsion of the seeds.
No. 15. Side view of seed.
No. 16. *Hybiscus Syriacus.* Dry.
No. 17. Same in water fifteen minutes.
No. 18. *Hypericum Ascyron.* Dry.
No. 19. Same in water five minutes.
No. 20. *Cassia Chamæcrista.* Dry.
No. 21. Same immersed in water six minutes.

No. 22. Spikelet of *Hordeum jubatum.* Dry.
No. 23. Same in water three hours.
No. 24. *Solidago Canadensis.* Dry.
No. 25. Same immersed in water five minutes.
No. 26. Calyx of *Brunella vulgaris.* Dry.
No. 27. The same wet.
No. 28. Calyx of *Monarda fistulosa*, showing slits near the base.
No. 29. The same seen from above when dry.
No. 30. The same when wet.
No. 31. Achenia of *Cnicus altissimus.* Dry.
No. 32. The same wet.
No. 33. *Dictamnus Fraxinella.* Dry.
No. 34. The same immersed in water fifteen minutes.
No. 35. *Viola palmata* var. *cucullata.* Very wet.
No. 36. Same drying out.
No. 37. Same very dry.
No. 38. Portion of spike of *Polygonum Virginianum*, showing fruit.
No. 39. Same, showing arrangement of fruit enlarged.
Ny. 40. End view of fruit with persistent styles.
No. 41. Styles enlarged.
No. 42. Side view of pedicel, showing peculiar modes of attachment.
No. 43. Front view of the same.

Notes from Pennsylvania.

At my solicitation, J. K. Small and A. A. Heller, students of Franklin and Marshall College, visited Lycoming County, Penn., on the 20th of last August, in order to search for *Asplenium fontanum*, L. along Lycoming Creek, where it was found by McMinn. The cliffs on the east side of the stream were explored for a distance of twelve miles, but without success. Those on the west side, not easily accessible on account of high water, were left for future examination.

From this point the young botanists proceeded to Luzerne County and spent the two following days about one of those little lakes or ponds, so common on the great mountain-plateau of N. E. Pennsylvania. Here they obtained a fine prize in *Aster concinnus*, Willd., and, had they then been aware of the fact, would have brought away a full supply. Mr. McMinn (not " Minn," as printed in the Synoptical Flora) was a civil engineer, who resided many years in Williamsport and collected the rarer plants of the region round about that city, as well as of the counties further west. He was the first, after the time of Muhlenberg, to meet with this *Aster* in its native haunts, and from him specimens reached H. Cosson of Paris, one of which came into the hands of Dr. Gray and is now at Cambridge. Later, it was found by Prof. Harvey in Arkansas. And, last of all, I had the good fortune to discover it not long since amongst unnamed species in the herbarium of Mr. E. A. Rau of Bethlehem, Pa. The specimens, five in number, were brought by his cousin, Mr. Robert Rau, from Moraviantown, Canada, eighty miles west of Niagara Falls.

Of the other plants gathered at the little lake, the most noteworthy are *Juncus pelocarpus* (known before as existing in Pennsylvania in a single bog of Monroe County), *Eleocharis olivacea* (new to the State) and, strangest of all, an *Artemisia* which closely resembles the European *A. Pontica*, but cannot be determined positively for lack of flowers. A foot or less in height, it covers a space of several rods square on the bank of the lake shore, in the heart of the wilderness, remote from fields, farm-houses and roads of any kind. How it was ever carried to such an out-of-the-way spot is a problem very hard to solve. The same thing, in the same condition, was collected by me, some years ago, on an embankment of the Belvidere and Delaware Railroad below Frenchtown, N. J., but its occurrence there can easily be accounted for.

THOS. C. PORTER.

Botanical Notes.

Is Solidago serotina, Ait. var. gigantea, A. Gray, a Hybrid? During the autumn, I collected seeds of *Solidago serotina*, Ait. var. *gigantea*, A. Gray, near Ithaca. In examining them with a view to selecting some of them to plant, they were all found to be infertile. The achenia were, to all external appearances, perfectly developed, but no embryo was found in any of them. So far as it goes this may be evidence of this variety being a cross between two other species, although it by no means proves it to be so. The plant is intermediate between *S. serotina*, Ait. and *S. Canadensis*, L. I have carefully examined specimens of both species and have failed to detect any character in the variety which may not be found in one of the species. Moreover, both of the species grow with the variety. To prove by direct crossing that one species crossed with the other will produce the variety, would be the only way in which to prove absolutely the supposition. Seeds of the two species collected at the same time and the same place, were fertile; the plants of the variety seemed to be healthy and strong.

If further observation should prove that the seeds of this plant are always infertile, this, taken with the place of growth, and the intermediate character, would be evidence enough, at least to suggest that *S. serotina*, Ait. var. *gigantea*, A. Gray is *S. serotina*, Ait. × *S. Canadensis*, L.

Cornell University. W. W. ROWLEE.

Aristolochia clematitis. I have recently received some specimens of this plant, collected near the centre of this county, with the information that it threatens to become a pest. Gray's Manual, 6th Edition, gives but one locality, that near Ithaca, N. Y.

It would be interesting to know, if attainable, the history of the introduction of this plant in each locality, and also the date when first noticed.

Melia Azederach. A specimen of this tree which had been grown as a pot-plant for about four years, was set in the open ground in the spring of 1888, and has since been thriving without any protection other than that of situation, producing both flowers and fruit the past two seasons. It stands near the south-west corner of the house, and is sheltered from all northerly winds. The locality is near Chester, or a little south of latitude 40°.

Of course our last two winters have been very mild, but has it ever been known to survive the winter so far north in any other locality?

Delaware Co., Pa. WILLIAM TRIMBLE.

Flaveria Contrayerba, Pers. This plant was collected by Mr. B. F. Bush near Courtney, Mo., far north of its recorded range. In all its gross aspect it agrees fully with the herbarium specimens under this name. Yet, the heads are five-to-eight-flowered, not "three-to-five-flowered;" and the ligule *does* slightly exceed the disk flowers. If the characterization of this species in the Synoptical Flora is absolute, then this must be a different species. But since the outward appearance of the plant from Missouri agrees so fully with *Flaveria Contrayerba*, and with no other species, I have after long hesitation decided to put it here. This in view of the well-known fact that the number of florets in the Compositæ frequently varies. The Syn. Flora puts *F. Contrayerba* under species with three-to-five-flowered heads, while the Missouri plant has them five-to-eight-flowered. Further, the typical plant is said to have "ligule not exceeding disk or wanting;" in this plant the ligule does exceed the disk flower, as stated. It would certainly seem possible, and probable, that this character might be subject to the same variation as the number of florets. Rather than make it a new species, therefore, or even a new variety, I have assumed that the assigned distinguishing characters must be subject to variation, and that the Missouri plant is still this species. JOHN M. HOLZINGER.

U. S. Dept. Agric.

Specimens of Halorageæ desired. The subscriber being engaged in a special study of the North American Halorageæ, wishes to examine plants of the family from all parts of the country, and will be greatly obliged to any of his correspondents or other botanists who will supply him with specimens.

Columbia College, Feb. 24. THOMAS MORONG.

Phlox bifida, again. Since the appearance in the November number of the BULLETIN of my note entitled, "Geographical Distribution of *Phlox bifida*," I have received specimens and communications which go to show than it has a more extended range than has been assigned to it. I have received specimens from J. J. Davis, of Racine, Wis., who informs me that they were collected on the sandy banks of Cedar River, at Vinton, Ia., where it grew abundantly. Prof. Beal, of Agricultural College, Mich., has sent me specimens collected by C. F. Wheeler the past season, on the shore of Klinger Lake, St. Joseph Co., Mich. As yet I have received no confirmation of a Missouri habitat. I would be glad to hear from any botanist who knows of its existence in that State.

FRANK E. MCDONALD.

Review of Foreign Literature.

Leitfaden der Botanischen Mikroskopie. Wilhelm Behrens. Braunschweig Harald Bruhn, Oct. 1890.

It may be desirable to call the attention of the readers of the

BULLETIN to a new book in technique for beginners in microscopic botany, by W. Behrens, which has recently been issued in Germany. The first eighty-three pages discuss, in a very readable manner, and with excellent illustrations, the simple and compound microscopes, the polariscope, spectroscope, methods of measuring, of drawing and photographing microscopic objects.

In order to present these subjects intelligently to the reader, the book is introduced by a discussion of the phenomena of light. The lenses and objectives are well illustrated, both in piece and in section, so that any one can easily understand their workings.

This is equally true of all the accessory apparatus. The remaining one hundred and twenty-five pages discuss, fully enough for all beginners, the better methods of preparing, hardening, staining, and preserving materials for microscopical examination.

Something of the care with which the minor details are looked after may be judged from the fact that over ten pages are devoted to careful directions concerning the selection and sharpening of knives, and methods of holding the same in free-hand cutting.

Directions are given for collecting, cultivating when necessary, hardening, fixing, bleaching, and macerating different kinds of tissues and material for the microscope. Also full instructions for making permanent mounts of various kinds.

Methods of embedding in glycerine–jelly, gum-arabic, celloiden, paraffin, and transparent soap, are all fully and explicitly given. Even some of the foreign bodies which are most likely to find their way into microscopic preparations, are discussed and illustrated.

The merits of this book are, first, that it gives the student directions about many minutiæ not generally spoken of in such books, but on points always sure to trouble the learner. To illustrate: on the use of the fine adjustment, which even advanced students sometimes neglect to their great disadvantage; or on the manipulation of the light for different effects, often not understood by even those who are far advanced in work. The instruction on this point, i. e. the positions of the mirror, the handling of the diaphrams, and the parts of the Abé condenser, is of greatest importance to any student of microscopy. The directions for free-hand cutting will prove valuable for such as have not had the advantage of good instructors.

Second, that in the directions for preparing and preserving material, the author has given a judicious selection of the best methods and solutions, omitting a great mass of formulæ and recipes, which only confuse the beginner. Such methods, formulæ, and solutions as have been given, have all been tried by the author and found to work well.

The book would make a valuable manual for our young students of botany were it translated just as it stands. It would give them in the hand the most recent methods for the manipulation of microscopic objects; which knowledge now must be picked up wherever it can be found.

W. P. WILSON.

Biographical Index to British and Irish Botanists. James Britten and G. S. Boulger. (Journ. Bot. 1888–1890).

This very useful index, published in the numbers of the Journal for the last three years, is now about completed. It consists of a list of all persons residing in the British Islands who have been at all prominent in the science, including collectors and patrons of Botany. The date and place of birth and death, the place of burial, chief titles, dates of election to the Linnæan or Royal Societies, with references to sources for further information, as the following sample will indicate.

SHUTTLEWORTH, ROBERT JAMES (1810-1874): b. Dawlish, Devon, Feb. 1810; d. Hyères, 19th April, 1874. Captain, 1st Regiment, Duke of Lancaster's Own, 1833. F.L.S., 1856. Orig. memb. B.S.Ed. Conchologist and critical botanist. Resided many years at Berne. 'Excursion in the Valais,' Mag. Zool. Bot. 1838. Had large herbarium, now in Herb. Brit. Mus. (see Journ. Bot. 1878, 179). Jacks. 158; R.S.C. v. 681; Trans. Bot. Soc. Ed. xii. 203; Bull. Soc. Bot. France, xxx. cxxxi.; Whittle, Hist. Preston, ii. 235; Journ. de Conch. xxii. 92. *Shuttleworthia* Meisn.=*Verbena.*

The authors now propose to issue the work as a reprint, and ask for subscriptions at four shillings per copy, bound in cloth, the list being brought down to January, 1891, and considerable information added to that already printed in the Journal. While the list is of not quite the importance to American botanists that it is to English there is so much matter of direct application to our own Botany that it really ought to be in the hands of all. We are so much interested in the success of this project that we will receive subscriptions to the work at $1 per copy, payments to be made when the book is received. N. L. B.

Index to Recent Literature relating to American Botany.

Actinella (*Hymenoxis*) *Texana, n. sp.* John M. Coulter and J. N. Rose. (Bot. Gaz. xvi. 27, 28).

Algæ and Mosses. The Geological Work of. W. H. Weed. (Am. Geol. vii, 48, 55).

This is in the nature of an abstract of the monograph upon the subject prepared by the author and published in the Ninth Ann. Rept. U. S. Geol. Surv., previously reviewed in the BULLETIN.

Apical Growth in the Roots of Osmunda and Botrychium,—Notes on the. D. H. Campbell. (Bot. Gaz. xvi. 37-43, Pl. v).

Asplenium Filix-fœmina as a Tree Fern. Katharine Brandegee. (Zoe, i. 293-295).

Catalogue of the Anthophyta and Pteridophyta of Ames, Iowa. A. S. Hitchcock. (Trans. St. Louis Acad. Sci. v. 477-532; reprinted "Contributions from the Shaw School of Botany," No. 7).

This is one of the most carefully prepared and valuable local floras ever published, giving the results of the author's studies in the vicinity of Ames during the past seven years. Localities for the rarer species are given in detail. The principle of using the earliest specific name has been closely adhered to, the original author being cited in parenthesis. Many critical and very useful notes on nomenclature and determination of species are given. Several old names are here first taken up, as follows: *Anemone patens*, L. var. *hirsutissima* (Pursh), for var. *Nuttalliana*, A. Gray; *Anemone Hepatica*, L. var *acuta* (Pursh), for *Hepatica acutiloba*, DC.; *Viola palmata*, L. var. *obliqua* (Hill), for var.

cucullata, A. Gray; *Kuhnia eupatorioides*, L. var. *glutinosa* (Ell.), for var. *corymbulosa*, Torr. & Gray; *Dysodia papposa* (Vent.), for *D. chrysanthemoides*, Lag.; *Lactuca spicata* (Lam.), for *L. leucophæa*, A. Gray; *Steironema quadriflorum* (Sims), for *S. longifolium*, A. Gray; *Acerates Floridana* (Lam.), for A. *longifolia*, Ell.; *Gentiana quinquefolia*, L. var. *occidentalis*, for *G. quinqueflora*, var. *occidentalis*, A. Gray; (there is a misprint in the spelling of the specific name of the synonym); *Stachys aspera*, Michx, var. *tenuiflora* (Willd.), for var. *glabra*, A. Gray; *Carex trichocarpa*, Muhl. var. *læviconica* (Dewey), for var. *Deweyi*, Bailey; *Diarrhena diandra* (Michx.), for *D. Americana*, Beauv. *Fraxinus viridis*, Michx. f., var. *pubescens* is described as new. There has been little effected in taking up old generic names, but we note that Mr. Hitchcock adopts *Castalia* for *Nymphæa* and *Homalocenchrus* for *Leersia*. The catalogue is a most important contribution to geographical botany, and should stimulate botanists all over the country to produce others of equal merit.

N. L. B.

Catalogue of Canadian Plants.—Part V. Acrogens. John Macoun. (8vo, pp. 249-428, Montreal, 1890).

This part completes the second volume of Prof. Macoun's great Catalogue, containing the Pteridophyta (the Filices and Ophioglossaceæ contributed by Dr. Burgess), included in Nos. 2956-3054. The greater part of the present fascicle is taken up with additions and notes on Parts I-IV. a very considerable number of Flowering Plants being added. Of these *Arabis Columbiana*, Macoun, and *Ruppia lacustris*, Macoun, are described as new; the latter is however antedated by Dr. Watson's name *R. occidentalis*, applied to the same plant. Mr. Macoun describes also two new varieties of *Carex canescens*. Prof. Scribner has studied the Gramineæ, new varieties and species being indicated in the genera *Alopecurus*, *Stipa*, *Agrostis* and *Festuca*. Mr. Arthur Bennett has examined the *Potamogetons*, and several novelties are listed. Part VI. of the Catalogue, including Characeæ, Musci and Hepaticæ is announced for the present year. We congratulate Prof. Macoun on the very successful progress his work. He is contributing more at the present time to our knowledge of North American Botany than any one else, and through his endeavors the distribution of Canadian Plants is becoming thoroughly worked out. N. L. B.

Catasetum fimbriatum. (Bot. Mag. t. 7158).

Choisya ternata. (Gard. xxxix. 115, illustrated.

A description and representation of this plant as it appears in a Devonshire garden.

Clethra alnifolia, var. *tomentosa.* (Gard. and For. iv. 64, f. 14).

Contributions à la Flore de l'Amérique équatoriale. Em. Drake del Castillo. (Journ. de Bot. iii. 73-77, 237–240).

This is an enumeration of the Ericaceæ aud Campanulaceæ collected by H. Poortmann in 1881-1882 in the Andes of Ecuador and Peru. New species are described in the genera *Macleania*, *Orthæa*, *Ceratostemma*, *Befaria* and *Centropogon.*

Coreopsideæ and Tagetineæ—Studies in. T. S. Brandegee. (Zoe, i. 308-314).

A discussion of species in the genera *Leptosyne*, *Heterospermum*, *Bidens*, *Porophyllum* and *Tagetes*, with descriptions of *Bidens nudata*, *B. refracta*, *Tagetes lacera* and *T. scabra* as new, all from Lower California.

Dahlias in Mexico. C. G. Pringle. (Gard. and For. iv. 50, 51).

Notes on *Dahlia pubescens*, *D. dissecta*, *D. coccinea and D. variabilis.*

Descriptions of Three New Species of Myxomycetes, with Notes on other Forms in Century XXV. of Ellis and Everhart's North American Fungi. Geo, A. Rex. (Proc. Acad. Nat. Sci. Phil. 1890, Part ii, 192-196).

The three new species described in this contribution are *Physarum tenerum*, *Trichia subfusca* and *T. erecta.*

Diplacus.—Revision of the Genus. Edward L. Greene. (Pittonia, ii. 141-157).

6 species are recognized. *D. longiflorus*, Nutt., replaces *D. arachnoideus*, Greene, Bull. Cal. Acad. i. 210, and *D. grandiflorus* replaces *D. longiflorus*, Greene, l. c. i, 96. *D. stellatus*, Kell. and *D. latifolius*, Nutt. are referred to *D. glutinosus* (Wendl.), Nutt. as varieties.

Dipladenia illustris, var. glabra. (Bot. Mag. t. 7156).

Euphorbiaceæ Collected by T. S. Brandegee, principally in the vicinity of Todos Santos, Baja California, January and February, 1890. C. F. Millspaugh. (Zoe, ii, 346-348).

The following species are described as new: *Euphorbia* (*Anisophyllum*) *biserrata* and *E.* (*Alectrotonum*) *Watsoni.*

Fritillaria recurva. Carl Purdy. (West Am. Sci. vii. 67, figured).

Fungi—New North American. J. B. Ellis and B. M. Everhart. (Proc. Acad. Nat. Sci. Phil. 1890, 219-249).

The following are described as new: *Typhula subfasciculata, Stereum atrorubrum, Hymenochæte rugispora, Asterina rubicola, A. bignoniæ, Chætomium pusillum,* (N. A. F. 2350), *Myriococcum consimile, Calosphæria alnicola, C. microsperma, Cœlosphæria corticata, Diaporthe nivosa, Valsa floriformis, V.* (*Eutypella*) *canodisca, Pseudovalsa stylospora, Thyridoria fraxini, Cryptovalsa sparsa, Diatrype Macounii, D. hochelagæ, Dyatrypella vitis, D. demetrionis, Ceratostomella mali, Ceratostoma juniperinum, C. parasiticum, C. conicum, Rosellinia albolanata, R. glandiformis, R. parasitica, R. Kellermanni, R. Langloisii, Anthostoma Ontariensis, Anthostomella Ludoviciana, Hypoxylon albocinctum, Poronia leporina, Physalospora zeicola, P. conica, P. pandani, Laestadia orientalis, L. apocyni, Sphærella conigena, S. spinicola, S. ciliata, S. angelicæ, S. macluræ, S. polifolia, Didymella Canadensis, D. cornuta, D. andropogonis, D. mali, Venturia parasitica, V. sabalicola, Diaporthe columbiensis, D.* (*Euporthe*) *leucosarca, D. crinigera, D. comptoniæ, D. Americana, D. megalospora, Didymosphæria andropogonis, Melanconis salicina, Valsaria salicina, Leptosphæria macluræ, L. steironematis, L. brunellæ, L. folliculata, Metasphæria rubida, Pleospora diaportheoides, P. hyalospora, Pyrenophora Zabriskieana, Fenestella amorpha, Ophiobolus trichisporus, Melanomma Commonsii, M. tetonensis, M. parasiticum, Wintera tuberculifera, Cucurbitaria Kelseyi, C. fraxini, C. setosa, Teichospora mammoides, T. mycogena, T. umbonata, T. papillosa, T. megastega, T. helenæ, T. Kansensis, Hypocrea pallida, H. melaleuca, Calonectria Dearnessii, Thyronectria chrysogramma, Chilonectria crinigera, Nectria diplocarpa, N. Sambuci, N. athroa, N. mammoidea, N. pithoi-*

des, *N. sulphurata*, *Homostegia Kelseyii*, *Dothidea Bigeloviae*, *Plowrightia staphyliana*, *P. symphoricarpi* and *Curreya shepherdiæ.* Under *Valsa glandulosa*, Cke., the authors state that specimens examined by them from several parts of the United States have the ostiola distinctly 4-5 sulcate. They therefore place it in the sub-genus *Eutypella* and take issue with Cooke who has described specimens from one of the same localities as a new species, *Valsa clavulata* [Grevillea, xviii. 86]. A. H.

Fungi—New species of Montana. J. B. Ellis and F. W. Anderson. (Bot. Gaz. xvi. 45-49, Pl. vii and figs. in text).

Lentinus pholiotoides, *Phoma ilicina*, *Coniothyrium ilicinum*, *Dothiorella Nelumbii*, *Volutella occidentalis* (Pl. vii, f. 1-6), *V. occidentalis*, var. *minor*, *Sporidesmium sorisporoides*, *Macrosporium puccinioides*, (Pl. vii, f. 7-11), *Æcidium Liatridis*, *Æ. Cleomis*, *Æ. Chrysopsidis*, *Pestaloziella Andersonii* (Pl. vii, f. 12-14) and *Helotium Montaniense*—the latter figured in the text.

Grasses—New. Geo. Vasey. (Bot. Gaz. xvi. 26-27).

The following new species and varieties are described : *Sporobolus pilosus*, from Kansas, *Bouteloua uniflora*, from Texas, and *Andropogon macrourus*, Michx., var. *pumilus*, also from Texas.

Hyphomycetes.—On certain New or Peculiar North American—I. Roland Thaxter. (Bot. Gaz. xvi. 14-26; Pl. iii. and iv).

The new species described are *Œdocephalum echinulatum*, *Œ. verticillatum* and *Rhopalomyces strangulatus.* A new genus, *Sigmoideomyces*, is described, with a single species, *S. dispiroides.* A syonopsis of the described species of *Œdocephalum* and *Rhopalomyces* is appended. The plates include the above named species, besides *Rhopalomyces elegans*, Corda, *Œdocephalum glomerulosum.* (Bull) Sacc., and *O. pallidum* (B. & Br.) Cost.

A. H.

Juglans Vilmoriniana.—M. L. de Vilmorin, (Gard. & For. iv. 51, 52, f. 11 and 12).

Account and description of a supposed hybrid between *Juglans regia* and *J. nigra.* The tree was planted as a seedling in a garden at Verriers, near Paris, and is now about seventy-five years old. Nothing is known of its origin. The seeds germinate readily, produce plants similar to the parent and these in turn produce fertile fruit. It is of interest in this connection to recall the description of the "Row Farm Walnut tree," (For. Leaves, ii. 133, 134), which is supposed to be a similar hybrid.

Labiatæ.—A Key to the North American Genera of the. Alfred C. Stokes. (Bot. Gaz. xvi. 49-52).

Les Piperacées de l'Ecuador, de la Nouvelle-Grenade et du Pérou, de la collection de M. Ed André, par M. C. De Candolle (Jour. de Bot. iv. 395-399).

Thirty-four species of *Piper* are enumerated in the collection of M. André, of which six are new, and of the genus *Piperomia* there are 45 species, of which ten are described for the first time. The actual number of Piperaceæ known from Ecuador and New Grenada is 139, 93 belonging to the genus *Piper* and 46 to the genus *Piperomia.*

Loti.—Enumeration of the North American. Edward L. Greene. (Pittonia, ii. 133-150).

After a critical study of the Old World specimens of *Lotus* contained in the eastern herbaria, in connection with a study of the types of most of the American species, Prof. Greene concludes that the plants usually referred to *Hosackia*, Benth. and *Syrmatium*, Vogel, are generically inseparable from the true *Loti.* He enumerates 55 species, three of which are described as new.

Lotus Tree.—Parry's. Albert Kellogg. (West Am. Sci. vii, 63-66, illustrated).

Contains descriptions of *Zizyphus Lotus*, *Z. vulgaris*, *Z. jujube*, *Z. xylopyrus, and Z. Parryi*—the latter figured.

Memoirs of the Torrey Botanical Club, Vol. ii. No. 2. (P. 27-56; 2 plates).

This number of the Memoirs, issued Dec. 23rd, contains an account by Miss Anna Murray Vail of the Spring Flora of Southwestern Virginia, as noted by a party who spent some days in exploring that region in May and June, 1890. The paper is annotated by Dr. Britton, who describes the following plants as new:—

Clematis Addisonii, named in honor of the president of the Club (*C. ovata*, Torr. and Gray, not Pursh), *Pentstemon lævigatus*, var. *canescens*, and *Senecio aureus*, var. *angustifolius*; he maintains *Ilex montana*, T. and G. (1848) as the correct name for the shrub usually called *I. monticola*, A. Gray (1856), and points out that *Arenaria stricta*, Michx., is the name which should be applied to *A. Michauxii*, Hook. f.; he maintains *Oxalis stricta*, L. as distinct from *O. corniculata*, and raises *Zizia aurea*, var. *Bebbii*, Coult. and Rose, to specific rank. Among the other most interesting plants noted are *Crepis pulchra*, L., a European Composite seen in large quantities along the railroad at Culpepper, *Veronica Anagallis* at Roanoke, not previously reported from so far south, *Anemone trifolia*, L., *Rhododendron canescens* (Michx.), Porter, and the introduced form of *Ranunculus sceleratus*, L. Miss Vail gives a complete enumeration of the flowering plants and ferns collected, taking up some old names, *Hepatica acutiloba*, DC. becoming *Anemone acuta* (Pursh) and *Trautvetteria palmata*, F. and M., becoming *T. Caroliniensis* (Walt.)

The Memoir also contains a paper by Mr. Arthur Hollick on the Autumn Flora of Southeastern Virginia, a record of a trip made in September. Among the more important finds were *Lespedeza striata*, *Andromeda nitida*, *Eleocharis ochreata*, and *Panicum gibbum*, all apparently here first reported from the state.

New or Noteworthy Species. Edward L. Greene. (Pittonia, ii. 158).

Sagittaria Sanfordi and *Lathyrus Jepsoni*, from near Stockton, Cal., are described as new.

Nicotiana colossa. (Gard. Chron. ix. 84, f. 25).

Nolina—A New. T. S. Brandegee. (Zoe, i. 305, 306).

Notes on North American Trees. XXIII. C. S. Sargent. (Gard. and For. iv. 75, 76).

Critical notes upon *Rhamnus Caroliniana*, *R. Purshiana*, *R. rubra*, *R. Californica*, *R.occidentalis, and R. tomentella* are contributed.

Notholæna Nealleyi, Seaton. Observations on the New Texas Fern as Described in "Contributions from the U. S. Hebarium," ii. p. 61, *no* 894, *June*, 1890, *and a Mexican Fern collected by C.*

G. Pringle near Guadalajara in 1888. Geo. E. Davenport. (Bot. Gaz. xvi. 53, 54).

The author makes use of the parallel column and concludes from the comparison of descriptions that *Notholæna Nealleyi*, Seaton, is not specifically distinct from *Notholæna* sp ? Pringle No. 1864. The conclusion is that the latter should rank as a variety of the former and be known as *N. Nealleyi*, Seaton, var. *Mexicana.*

Quebracho, Part I. H. H. Rusby. (Reprint from Bull. Pharm. Jan. 1891, illustrated).

An illustrated account of *Aspidosperma Quebrachoblanco* and its confusion with *A. Colorado.*

Rafinesque—Some Genera of. Edward L. Greene. (Pittonia, ii. 120-133).

Professor Greene points out that *Lepargyræa*, Raf. antedates *Shepherdia*, Nutt. by about a year, and transfers our three described species to that genus, that *Ioxylon*, Raf. has about equal precedence over *Maclura*, Nutt. the proper name for the Osage Orange being *I. pomiferum*, Raf. and that *Bolelia*, Raf. should replace *Downingia*, Torr. ; he takes up *Micrampelis*, Raf. for *Echinocystis*, Torr. and Gray, and *Megarrhiza*, Torr., following the point made by Mr. Jas. Britten in Journ. Bot. xxvi. 261 (1888), and recognizes *Ptiloria*, Raf. (1832) as prior to *Stephanomeria*, Nutt. (1841), consisting of 16 species, two of which are here first described.

Ranunculaceæ aus dem Westlichen Nord Amerika, gesammelt in Auftrage Dr. Dieck's-Zoschen. Bestimmt von J. Freyn. (Deutsche Bot. Monats. viii. 73-79).

This is an enumeration of the Ranunculaceæ collected in British Columbia, Montana and Oregon, by the expedition sent by Dr. Dieck in 1887 and 1888 under the charge of Dr. Röll. The following species are given : *Clematis ligusticifolia*, T. and G. ; *C. Pseudoatragene*, O. Kuntze, var. *normalis*, O. Kuntze (*C. verticillaris*, DC.) ; *Thalictrum occidentale*, A. Gray ; *T. Cornuti*, Lawson, not L., which is apparently what we now know as *T. polygamum*, Muhl.; *Pulsatilla occidentalis*, Freyn (*Anemone occidentalis*, S. Wats ; *Anemone parviflora*, Michx ; *Anemone* *cyanea*, Freyn, sp. nov., which is pretty clearly *A. Grayi*, Kellogg and Behr; *Anemone multifida*, Poir., var. *globosa*, T. and G.; *Trautvetteria grandis*, Nutt.; *Ranunculus longirostris*, Godron, (*R. circinatus*, A. Gray); *R. Grayanus*, Freyn. n. subsp. (*R. aquatilis heterophyllus*, T. and G.); *R. radicans*, C. A. Meyer (*R. multifidus*, var., *repens*, S. Wats; *R. natans*, A. Gray, not C. A. Meyer); *R. Cymbalaria*, Pursh; *R. reptans*, L., var., *strigulosus*, Freyn; *R. Eschscholtzii*, Schlecht.; *Trollius Americanus*, Muhl. (*T. laxus*, Salisb. must replace this, as Muhlenberg's name is without description); *Delphinium variegatum*, T. and G. and *D. bicolor*, Nutt. N. L. B.

Rose Bay—Southern Stations of. T. S. Brandegee. (Zoe, i. 315.

Note on the occurrence of *Rhododendron Californicum* in Santa Cruz Co., Cal.

Sarcodes sanguinea. Thos. Meehan. (Bot. Gaz. xvi. 54).

In this note the author contends that this plant is not a root-parasite but a saprophyte.

Tricuspidaria dependens. (Bot. Mag., T. 7160).

Two New Plants from the Cascade Mountains. B. L. Robinson. (Bot. Gaz., xxi. 43-45. Pl. vi).

Luina Piperi and *Silene Suksdorfii* are described and figured as new, collected by Mr. C. V. Piper. The *Silene* had previously been found by Mr. Suksdorf.

Undescribed Plants from Guatemala. VIII. John Donnell Smith. (Bot. Gaz., xvi. 1-14, Pl. i. and ii).

Description of the following new species and varieties are given by Capt. Smith, M. A. Cogniaux, Dr. Masters and others. *Bocconia vulcanica*, *Chorisia soluta*, *Myrodia Guatemalteca*, *Heteropteris retusa*, *Rubus occidentalis* L., var. *grandiflora*, *Potentilla Donnell-Smithii*, *Agrimonia parviflora*, Ait., var. *macrocarpa*, *Tibouchina Bourgaeana*, *Monochaetum diffusum*, *Conostegia hirtella*, *Miconia Guatemalensis*, *M. Tuerckheimii*, *Clidemia laxiflora*, Walp., var. *longipetiolata*, *C. Donnell-Smithii*, *Jussiæa Peruviana*, L., var. *glaberrima*, *J. pilosa*, H.B.K., var. *robustior*, *Passiflora clypeophylla*, *P. allantophylla*, *P. transversa*, *P. ornithoura*, *P. dicthophylla*, *Melothria Donnell-Smithii*, *M.*

Donnell-Smithii vars. *hirtella* and *rotundifolia*, *Anguria oblongifolia*, *A. diversifolia*, *Gurania Donnell-Smithii*, *Sicyos longisepalus*, *Cephaelis glomerulata*, (Pl. i.) *Lobelia laxiflora*, H.B.K., var. *insignis*, *Macleania cordata*, Lem., var. *linearifolia*, *Arctostaphylos pungens*, H.B.K., var. *cratericola*, *Daphnopsis Tuerckheimiana*, *Myriocarpa longipes*, Liebm., var. *Yzabalensis* and *Triuris brevistylis*. *Solanum olivæforme*, previously described, is figured on Pl. ii. There is also a note to the effect that the plant described as *Nephrodium duale*. (Bot. Gaz. xv. 29) should be referred to *Aspidium ascendens*, or better designated as *Nephrodium ascendens*.

Viburnum molle. C. S. S. (Gard and For. iv, 29, p. 8.)

Viola hastata. (Gard. and For. iv. 76, p. 16).

Viola ocellata. (Gard. and For. iv. 51, p. 13).

Woodwardia radicans. W. H. Gower. (Gard. xxxix. 127, illustrated).

Proceedings of the Club.

WEDNESDAY EVENING, JAN. 28.

Dr. Thos. Morong in the Chair and 28 persons present.

Mrs. E. Dwight Kendall, Miss Sabin G. Ayres and Mr. J. K. Haywood were elected active members.

Dr. Northrop read the announced paper of the evening, "Notes on the Flora of the Bahamas," illustrated by specimens and lantern views.

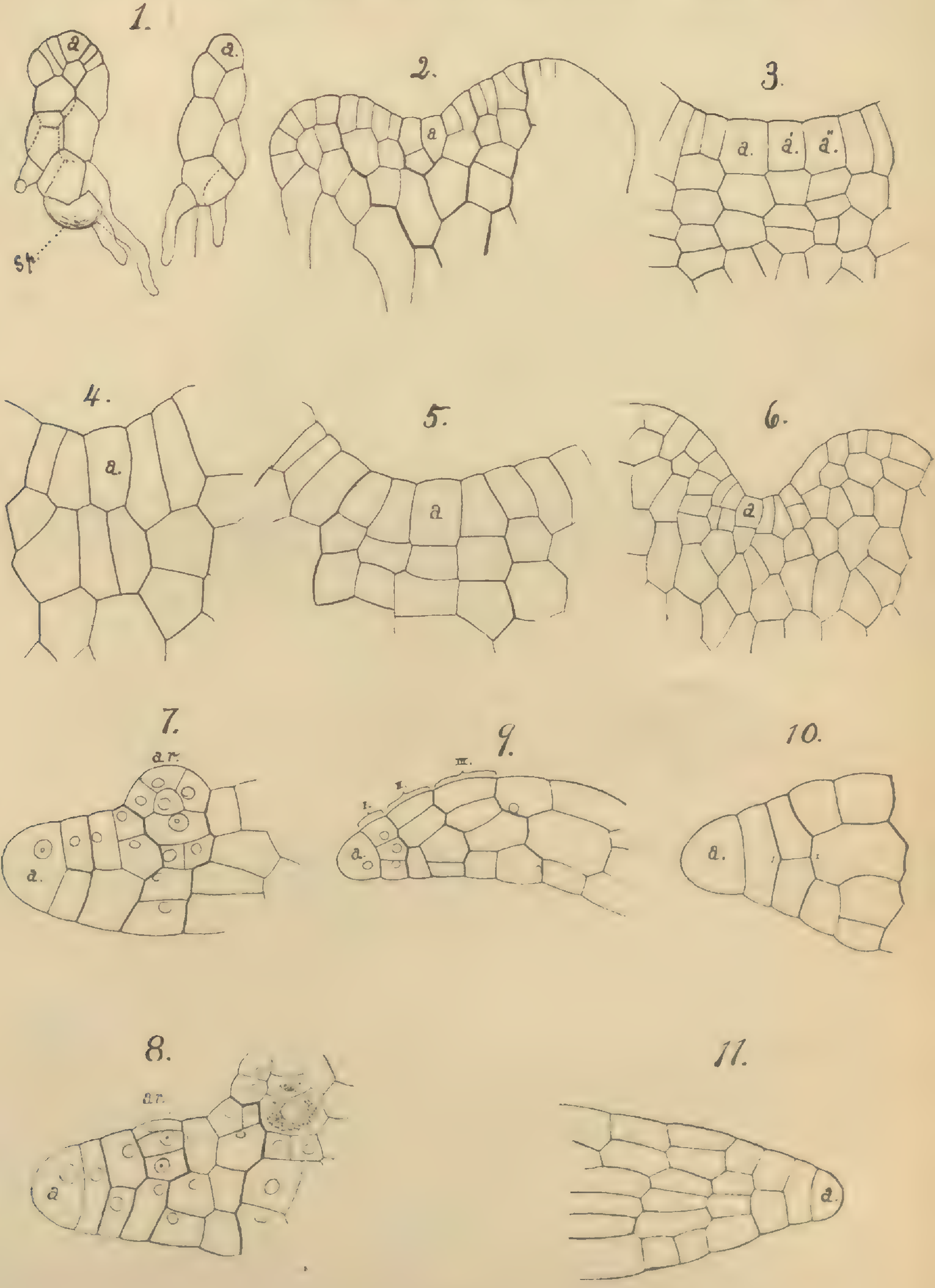
TUESDAY EVENING, FEB. 11.

The President in the Chair and 13 persons present.

Miss Helen Lauterbach was elected an active member.

Prof. Byron D. Halsted read the announced paper on "Root Decays of the Sweet Potato," illustrated by diagrams. He described the several fungi which attack the roots, causing the several kinds of decay. (See Bulletin New Jersey Agric. Exper. Station No., 76).

Dr. Britton exhibited a bramble collected by Dr. C. F. Millspaugh on the mountains of West Virginia, peculiar in its entirely unarmed stem and glabrous, acuminate leaflets, for which he proposed the name *Rubus Millspaughii*.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D.H. Campbell - del.

D. H. Campbell:—Apical Growth of Fern Prothallia.

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Influence of Moisture upon Dehiscent Fruits.

B. D. Halsted and D. G. Fairchild.

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BIOGRAPHICAL INDEX

OF

BRITISH AND IRISH BOTANISTS,

BY

JAMES BRITTEN, F.L.S., and G.S. BOULGER, F.L.S.

(*See review in this number of the* BULLETIN.)

This Index, which has been published in the numbers of the "Journal of Botany" for the last three years, and which is now nearly completed in its serial issue, has elicited much more general interest than its compilers expected.

During its progress through the pages of the Journal, the authors have made numerous additions to the information given, and some corrections. The list of names has also been considerably extended, and will be brought down to the end of 1890. They have been encouraged to think that a reprint of the list, embodying these additions and corrections, would be convenient for those who find it somewhat difficult of consultation in its present form, and would also serve as a handy volume of reference for others specially interested in Botanical Biography.

The plan of the work, as readers of the "Journal of Botany" will be aware, has been to be liberal in including all who have in any way contributed to the literature of the science, who have made scientific collections of plants, or who are known to have otherwise assisted in the progress of Botany, exclusive of pure Horticulture. Where known, the name is followed by the years of birth and death, and in other cases an approximate date is given. Then follows the place and day of birth and death, the place of burial, chief titles, dates of election to the Linnaæn and Royal Societies, or chief University degrees. In conclusion, reference is made to the chief sources of further information, in which Pulteney, Rees, Pritzel, Jackson, and the Royal Society's Catalogue are first quoted, and then the fullest known record, with a note of any portrait and of genera dedicated to the various persons catalogued, or, in the absence of genera, of species. Some estimate of the extent of the work may be gathered from the fact that in its serial form it comprises nearly 1700 names, and this number will be largel increased in the reprint.

The volume will be bound in cloth, and will be issued at 4*s.* (postage paid) per copy, to subscribers whose names are received before publication, the published price being 6*s.* 6*d.* The printing will be begun early in 1891, and the book will be issued in the course of that year. Only 500 copies will be printed. Intending subscribers may send their names to

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Vol. XVIII.] New York, April 4, 1891. [No. 4.

On the Formation of the Flower Buds of Spring-Blossoming Plants During the Preceding Summer.

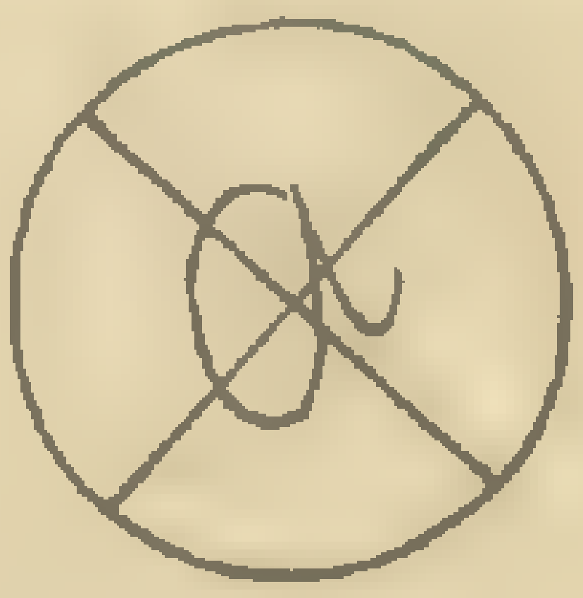
By Aug. F. Foerste.

For a number of years it has been an interesting subject for me to dissect the scale-protected, and usually subterranean, winter buds of plants blossoming in the spring, in order to ascertain the earliest date at which the *flower* buds of the *coming* season can be discerned. Having recently had unusually good opportunities for continuing these studies, I present here a part of the results.

The first set of observations were made in the vicinity of Rutland, Vermont, in the district lying between the Green Mountain and the Taconic ranges, during the middle of August. *Sanguinaria Canadensis* then had the flower bud considerably developed, being at least an eighth of an inch long, and containing all the elements of the future blossom in easily recognizable form. *Fragaria Virginiana* showed a cluster of flower buds, the largest of which was a sixteenth of an inch long, the entire cluster being so densely covered with close villous hairs as not to admit of easy recognition of its true character. In *Cornus Canadensis* the flower bud cluster could be readily distinguished, the buds being a thirty-second of an inch or less in diameter. *Pyrola elliptica* has a scaly bud which is not subterranean. The scales being removed, the tiny raceme of flower buds comes to view. Many of the buds have a diameter of less than a fortieth of an inch. *Asarum Canadense* has scaly buds which usually lie flattened close to the ground, covered by fallen leaves, but not subterranean. The enclosed flower bud is about an eighth of an inch long, showing all the structural elements distinctly, although in a miniature form. *Liparis Lœselii* has solid bulbs, toward one side of which, subtended by the inner of the two root leaves, is a small scaly bud, containing the flowering scape of the coming season, the buds of which are so minute as only to be discernable with the aid of a lens. *Smilacina racemosa* shows the terminal panicle, only the lower buds of which can be distinguished even with the aid of a lens. *Maianthemum Canadense*, however, presents these buds in much more recognizable form, being at least a thirty-second of an inch in diameter. *Clintonia borealis* has a scaly bud at the end of a root stalk, usually at least six inches long. In this bud are found the flower buds of the next season distinctly formed in all their parts. Some of the buds slightly exceeded a sixteenth of an inch in length. Nevertheless, the parts were sufficiently well formed to permit me, who not living near its haunts, was up to that time ignorant of the systematic position of the plant, to analyze these flowers which were to blossom next spring sufficiently well to correctly determine its Liliaceous character, and thus to permit its identification. *Trillium erythrocarpum* possessed flower buds a quarter of an inch long and all its parts distinctly developed. *Arisæma triphyllum* presented the so-called "flower" in well developed form, an eighth of an inch long. The spathe was as long as the spadix, and on the latter the minute female elements could be readily detected.

The second set of observations were made during the middle of September, in the vicinity of Mt. Greylock, Berkshire County, Massachusetts. At the northern end of the Bellows Pipe Valley, *Caulophyllum thalictroides* was found, containing in a scaly bud the leaves for the next season's growth, and a dense cluster of tiny buds, about a fortieth of an inch in diameter, and which were destined, when lengthened out, to form the loose panicle of next spring. *Mitella diphylla* reverses the rule in regard to the inflorescence of most spring-flowering plants, by being not directly terminal. The flower clusters are found in lateral elements of the scaly bud on opposite sides of a terminal leaf bud which forms the most important part of the scaly bud. In these lateral buds occur the two leaves which are usually formed half way up the scape of the plant, and the cluster of minute flower buds, rather covered with hairs, which were destined to terminate these scapes of lateral origin.

Along Le Chien's Creek, northeast of Berkshire, Mass., *Uvularia perfoliata* was found with the terminal flower bud at least a quarter of an inch long, and all its elements distinctly formed. *Aralia quinquefolia* showed the flower buds readily, especially when a lens of low power was used. The individual buds were a fortieth of an inch or less in diameter.



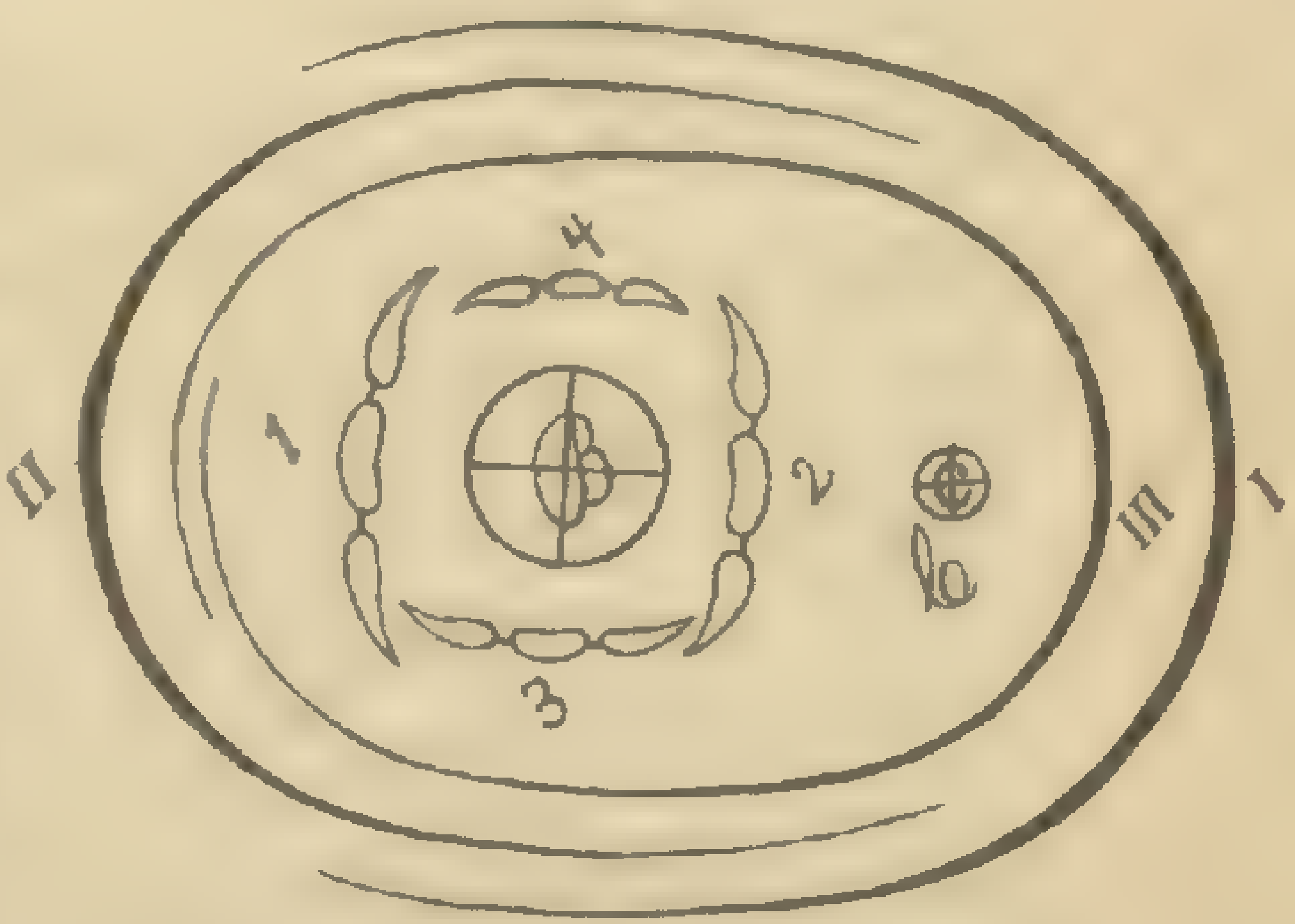


Diagram of *Aralia quinquefolia.*

The third set of observations were made in the latter part of September, between East Nassau, Rensselaer County, and Chatham, Columbia Co., both in New York State. *Thalictrum dioicum* contained the panicle of minute flower buds in recognizable form. *Epigæa repens* had scaly buds hidden among the moss but not covered by soil. On removing the scales, the small flower buds of the next season were readily discovered. *Chimaphila umbellata* also possesses a scaly bud which is not subterranean, but is found at the centre of the cluster of leaves terminating the little erect stalks rising directly from the ground. On removing these scales the minute flower buds can be readily discovered with a lens. *Cypripedium acaule* is another plant with which I had previously been unacquainted. On dissecting the subterranean scaly bud, I discovered two basal leaves and a large bract below the base of a flower bud, at least a quarter of an inch long. The two perfect anthers, on either side of a third sterile one with dilated tip, above the stigma, showed that the specimen was one of the Cypripedieæ, and the inflated, sac-like lip, already distinctly formed suggested that it was a true *Cypripedium*; whereas the two basal leaves, and the scape-like character of the rest of flowering stem, identified the species as *C. acaule*. In this way, I think it would be readily possible for any one already familiar with the general structure of flowering plants to identify many of the earlier perennial spring-flowering forms out of their season, by means of the flower buds destined to blossom first the ensuing year. *Streptopus roseus* has subterranean scaly buds which when dissected show the leaves of next year, and the extra-axillary flower bud of that season, but at the time examined only a twenty-fifth of an inch long.

In some of my previously published notes I have mentioned similar facts in regard to part of the species cited above, and also other additional varieties. In the January number of the Botanical Gazette of 1883, "The Hibernaculum of *Asarum Canadense*" was described. A paper on "The Hibernacula of Herbs" was published in the November number of the American Naturalist, of 1883. In this paper *Asarum Canadense*, *Arisæma triphyllum*, and *Sanguinaria Canadensis*, were described. In addition to these, the early appearance of flower buds in other spring plants, so far not mentioned in the present article, were noted. *Anemone Hepatica*, *Jeffersonia diphylla*, *Diclytra Cucullaria*, *Claytonia Virginica*, *Uvularia grandiflora*, *Trillium sessile* and *Symplocarpus fœtidus*. Most of these observations were unfortunately made as late as the middle of winter, extending into March, and therefore do not have the value of those taken this year in August and September, but judging from the strongly developed character of the flower buds of these plants when examined, I should judge that their initial stage could be detected much earlier. In the March number of the BULLETIN for 1884, in "The Development of *Dodacatheon Meadia*," the early development of the flower buds of that plant is described. An article entitled "Some Morphological Notes on *Caulophyllum thalictroides*," in the July number of the BULLETIN for 1887, gives some general views on the questions here involved, and is, I hope, substantiated by the additional facts now cited. "The Development of *Symplocarpus fœtidus*," in the June number of the BULLETIN for 1888, gives a fuller description of the curious method of development and arrangement of the flower buds of that plant.

The total number of species investigated by me therefore is twenty-eight. All of these possess the same peculiarity of starting the formation of their flower buds during the summer of the previous year, and often attaining considerable development before the retarding influences of winter become effective. No doubt the warmer sunny days of winter permit still further growth, so that when spring has actually come, the increased warmth causes these flower buds to complete their development rapidly, and to assume the tinted garb in which we are more accustomed to recognize them. The earlier blossoming plants, such as the Blood Root, Twin Leaf, Skunk Cabbage and *Trillium*, usually show their flower buds, in the fall, in a more advanced stage of development than those which flower later. The earlier flowering plants, also, as a rule have shorter stems and possess less foliage than those which blossom later. Perennial plants which do not develop flowers until in late spring or during the summer, of course, also possess scaly winter buds; but these buds only contain the earlier developing leaves; the later leaves and the flowers, are not formed until the scaly bud has burst and the growth of the year has well begun.

The conclusion therefore seems to be, that many spring flowers owe their early development to a combination of circumstances, already determined during the previous summer. These are a decrease in the number of internodes, and hence also, of the leaves produced before the development of flower buds begins; and the early origination and rapid development of flower buds in their scaly covering before winter sets in.

It is probable, that as a rule, the ancestors of spring plants are to be sought in more southerly districts, where the length of the summer and the shortness of the winter season make elaborate winter scale protections for the buds less important. On the other hand, it has seemed to me that the change from a more southerly climate to a northern climate was not exactly calculated to produce spring-flowering plants. It would seem more reasonable to suppose, that as southern plants migrated northwards, the cooler climate would retard their period of flowering so as, at first, to make northern summer flowering plants of the earlier southern types. In the course of time they might adapt themselves to the cooler condition there found.

However, as a plant which had become accustomed to a more northern climate migrated southward, the reverse conditions would operate; and a plant which did not flower until early in the summer farther north, would immediately become a spring-flowering plant on being transplanted to a warmer climate. It is not likely that in the migrations of plants the tendency towards northward migration is very distinct, from the inclination to remain in their more congenial southern homes. However, it is probable that in a general way northern plants, and spring-blossoming plants, are related; and that the causes which tend to produce the one, when exerted in a different way, also tend to produce the other. The result finds its expression in the Botanies, when the distribution of a spring-flowering plant is given as being from a certain line northward, instead of southward, as is apt to be the case of true summer-flowering plants.

It is very natural that the flower buds intended to blossom the succeeding spring should occasionally be prematurely developed by the warm weather towards autumn. Autumn flowering of fall plants has been mentioned so frequently by writers that I will give only two cases in point: *Cornus Canadensis*, found in flower at Rutland, Vermont, late in August; and *Fragaria Virginiana*, also seen in blossom, on Mt. Greylock, near North Adams, Massachuetts.

This, however, is a different phenomenon from the fall-flowering of spring flowers which keep up a desultory sort of flowering all summer, but are apt to blossom again freely in the fall; as is the case with dandelions, chickweed, and similar plants. In the case of the fall-flowering of violets, the fall blossoms are simply the more mature and typical continuation of a long series of flowers, which during the summer are represented only by stunted cleistogamous forms. Then again, many spring-flowering annuals are apt, in the fall, to be again brought to the point of flowering by very favorable weather, from seed which in the ordinary course of nature would have developed to the point of a flowering plant first, the succeeding spring. The cases of the Cornel and Strawberry referred to above, are however, instances of premature development of a flower bud which was already in existence in accordance with the ordinary laws of nature.

Having shown that the development of the flower buds of spring plants, during the previous summer and autumn, was quite a common occurrence, it becomes important now to investigate the life history of certain early spring-blossoming perennials, such as *Dentaria laciniata*, *Erigenia bulbosa*, and *Isopyrum biternatum*, which, although flowering early in the season, do not seem to have the flower buds even started in the winter buds so far examined.

An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885-1886.—XVI.

(Continued from p. 38.)

MANETTIA (?) DIFFUSA, sp. nov. Ramulis gracillimis glabris, teretibus; foliis gracile petiolatis, ovatis tenuis glabris acutis vel acuminatis, 5-6 cm. longis, basi obtusis vel cordatis; inflorascentia axillari et terminali, cymosa-paniculata; pedunculis pedicellique gracillibus, glabris; bracteis minutis; corolla 6mm. longa, cylindracea, tubus basi constricta. Resembling *M. paniculata*, Pœpp. and Endl. in habit but very different from that plant. Guanai, 2,000 ft. (2121).

Cosmibuena obtusifolia, R. & P. Fl. Peruv. iii. 3. Mapiri, 2,500 ft. (2103).

Condaminea corymbosa (R. & P.), D.C. Prodr. iv. 402. Yungas, 6,000 ft. (1898).

Chimarrhis, sp. Yungas, 6,000 ft. (2446).

Chimarrhis, sp. Same locality (2447).

Pogonopus tubulosus (D.C.), Schum. in Mart. Fl. Bras. vi. Pars. vi. (2), 265. Guanai, 2,000 ft. (2090).

Warszewiczia coccinea (D.C.), Klotzch, Mon. Ber. Akad. Wiss. Berl. 1853, 496. Guanai, 2,000 ft. (1953); Yungas, 6,000 ft. (1954); Falls of the Madeira, Brazil (1955).

Sipanea pratensis, Aubl. Guian. i. 147. (*S. hispida*, Benth. Hb. Kew). Mapiri, 2,500 ft. (2461).

Oldenlandia herbacea, D.C. Prodr. iv. 425. Falls of the Madeira, Brazil (2156).

Isertia bullata, Schum. loc. cit. 286 (?). Mapiri, 2,500 ft. (1895). I have not seen the type of Herr Schumann's species described as having cordate leaves. The leaves of our plant are narrowed at the base, otherwise much like those described by him.

Sabicea cana, Hook. f. Ic. Pl. t. 247. Mapiri, 2,500 ft. (1905).

Sabicea aspera, Aubl. Guian. 194, t. 76. (*S. hirsuta*, H.B.K.) Guanai, 2,000 ft. (1897); Mapiri, 2,500 ft. (1904).

Coccocypselum canescens, Willd. ex. Cham. & Schlecht. Linnæa, iv. 139. Yungas, 4,000 ft. (1397); Mapiri, 2,500 ft. (1896); Falls of the Madeira, Brazil (2099).

COCCOCYPSELUM MACROPODUM (R. & P.) (*Psychotria macropoda*, (R. & P.) Mapiri, 2,500 ft. (2098).

COCCOCYPSELUM GLABRUM. sp. nov. Herba ascendens, caulibus acutangulis glabris, 15-20 cm. altus. Petiolus 1 cm. longus; stipulæ subulatæ; folia ovato-lanceolata, acuta, basi obtusa, 4-6 cm. longa, 2-3 cm. lata, glabra; inflorascentia capitata, 5-10 mm. diametro; pedunculus 2 cm. longus; bacca 2 mm. diametro.

Yungas, 4,000 ft. (2479). The same as Matthew's Nos. 850 and 1943 from Peru, Herb. Kew.

Hamelia patens, Jacq. Stirp. Amer. 74, t. 50. Mapiri, 5,000 ft. (2105).

HOFFMANNIA BRACHYCARPA, sp. nova. Ramis adscendentibus vel erectus obtusangulis; foliis breve petiolatis vel sessilibus, obovatis, apice acuminatis basi cuneatis, supra glabris, subtus minute ferrugineo-pubescentibus, 20-30 cm. longis, 7-8 cm. longis, margine integris; inflorascentia axillaris, pedunculi gracili, 2 cm. longi; corolla ovarium aequale; bacca 2½ mm. longa 2 mm. lata. Yungas, 4,000 ft. (2522).

Bertiera Guianensis, Aubl. Guian. i. 180, t. 69. Guanai, 2,000 ft. (2118).

Posoqueria longiflora, Aubl. Guian. i. 134. t. 51. Junction of the Rivers Beni and Madre de Dios (2220).

Basanacantha spinosa (Jacq.), Schum. in Mart. Fl. Bras. vi. Pars. vi. 2, 376. Junction of the Rivers Beni and Madre de Dios (2157) (*Randia glabrescens*, Spruce).

Genipa Americana, L. Sp. Pl. Ed. 2, 251, var. *latifolia*, Spruce, Herb. Kew. Junction of the Rivers Beni and Madre de Dios (1899).

Chomelia paniculata, Benth. in Herb. Kew. Junction of the Rivers Beni and Madre de Dios (1878); Mapiri, 2,500 ft. (2117).

Chomelia, sp. Falls of the Madeira, Brazil (1490). I determined this at Kew as "*C. pubescens*, Benth" but there is a *C. pubescens*, C. & S. described in Schumann's Rubiaceæ of the Brazil Flora, p. 36. with which the plant does not agree.

Chomelia, sp. Guanai, 2,000 ft. (2659).

Coffea Arabica, L. Unduavi, 8,000 ft. Cultivated. (1900).

Coussarea, apparently undescribed. Junction of the Rivers Beni and Madre de Dios (2402).

Coussarea, sp. Beni River (2677) collected in fruit only.

Coussarea? Mapiri, 2,500 ft. (2559). The same as Fendler's No. 1990, from Tovar, Venezuela.

Faramea salicifolia, Presl. Symb. Bot. 24, t. 70. Yungas, 6,000 ft. (1869); Unduavi, 8,000 ft. (1870); Mapiri 2,500 ft. (2120), (2626), the later collected in fruit and referred to this species witn some hesitation.

Faramea Montevidensis, D.C. Prodr. iv. 497. Junction of the Rivers Beni and Madre de Dios (1874).

Faramea breviflora, Benth. in Herb. Kew. Falls of Madeira, Brazil. (2571.) Name not in Schumann's Rubiaceæ of the Brazil Flora.

Psychotria alba, R. & P. Fl. Peruv. ii. 58, t. 205. (*Mapouria alba*, Muell. Arg). Yungas, 4,000 ft. (2110) (1866); Guanai, 2,000 ft. (1889); Junction of Rivers Beni and Madre de Dios (1877) (1875).

Psychotria Casiquiaria, Muell. Arg. in Schum. Mart. Fl. Bras. vi. Pars v. 324. Mapiri, 2,500 ft. (2109). The same as Spruce, Rio Negro, No. 3436.

Psychotria lupulina, Benth, in Hook. Journ. Bot. iii. 230. Falls of the Madeira, Brazil (1873); Beni River (1872).

Psychotria brachybotra, Muell. Arg. in Schum. loc. cit. 327. Yungas, 6,000 ft (1887). The same as Spruce, Rio Negro, No. 2190.

Psychotria barbiflora, D.C. Prodr. iv. 509? Mapiri, 2,500 ft. (2112). Specimens too old for certain determination.

Psychotria Marcgravii, Spreng. Syst. Cur. Post. 79. Yungas, 6,000 ft. (1893).

Psychotria Paraensis. Muell. Arg. in Schum. loc. cit. 244. Falls of Madeira, Brazil (2114).

Psychotria brachyloba, Muell. Arg. loc. cit.? Mapiri, 5,000 ft. (1864).

PSYCHOTRIA CHIONANTHA (D.C.) (*Palicourea chionantha*, D.C. Prodr. iv. 526; *Psychotria Luschnathii*, Mart. Herb. Fl. Bras. 311). Mapiri, 5,000 ft. (1883).

PSYCHOTRIA BRACHYPODA (Muell. Arg.) (*Mapouria brachypoda*, Muell. Arg. in Schum. loc. cit. 422). Mapiri 2,500 ft. (1882). The same as Burchell's No. 3318 from San Paulo, Brazil.

Psychotria flexuosa, Willd. Sp.Pl. i. 966. Mapiri, 5,000 ft. (1884).

Psychotria racemosa, Willd. Sp. Pl. i. 966. Mapiri, 2,500 ft. (1867).

Psychotria tabacifolia, Muell. Arg. loc. cit. 236. Mapiri, 2,500 ft. (1880).

Psychotria viridis, R. & P. Fl. Per. t. 210. Guanai, 2,000 ft. (2515). The same as Matthews, No. 1949, Peru, Herb. Kew.

PSYCHOTRIA CROCEA (Schlecht.) *Palicourea crocea*, Schlecht, Linnæa, xxviii. 525 Beni River (2116).

Psychotria pilosiuscula, Griseb. Mapiri, 2,500 ft. (2480).

Psychotria crassa, Benth. Mapiri, 2,500 ft. (2113).

Psychotria cornigera, Benth. Yungas, 4,000 ft. (1865; 1881).

Psychotria, near *P. venulosa*, Muell. Arg. Falls of Madeira, Brazil (1879).

Psychotria near *P. idotricha*, Muell. Arg. Mapiri, 2,500 ft. (2489).

Psychotria leiocarpa, C. & S. Linnæa, 1829, 22. Guanai, 2,000 ft. (2161).

PSYCHOTRIA NIVEO-BARBATA (Muell. Arg.) (*Mapouria niveobarbata*, Muell. Arg.; Schum. in Mart. Fl. Bras. vi. Pars. vi. 2. 401). Mapiri, 2,500 ft. (1886). The same as Glaziou's No. 7684 from Rio Janeiro, Herb. Kew.

PSYCHOTRIA UMBROSA (Muell. Arg.) (*Mapouria umbrosa*, Muell. Arg. Flora 1876, 459). Mapiri, 2,500 ft. (1868). The same as Spruce's No. 660, Herb. Kew.

Psychotria. Guanai, 2,000 ft. (2558).

Psychotria. Mapiri, 2,500 ft, (1894).

Psychotria (?) Yungas, 6,000 ft. (1885).

Psychotria. Junction of the Rivers Beni and Madre de Dios (2575).

Psychotria. Mapiri, 2,500 ft. (1871).

Psychotria tomentosa (Willd.), Muell. Arg., Schum. loc. cit. 370. Mapiri, 2,500 ft. (853); Mapiri, 5,000 ft. (854; 855).

Rudgea micrantha, Muell. Arg. Flora, 1876, 454. Falls of the Madeira, Brazil (2108).

Rudgea Amazonica, Muell. Arg. loc. cit. 449. Junction of the Rivers Beni and Madre de Dios (1890).

Rudgea Hostmanniana, Benth. Yungas, 4,000 ft. (1888; 1892). Mapiri, 5,000 ft. (1891).

Rudgea. Mapiri, 2,500 ft. (1876).

The Fertilization of Three Native Plants.[*]

By E. G. Hill.

I.—*Campanula aparinoides*, Pursh.

It is well known that species of *Campanula* are adapted to cross-fertilization by the agency of insects, the flowers being proterandrous. This was clearly worked out and described by C. Sprengel in his famous book, the pioneer of work in this line, published at Berlin in 1793[†]. The illustrations in the plates (Taf. 9, 11.) accompanying the letter-press are good representations of what may be seen in species figured there, or in those allied to them. Hermann Müller, in his two principal works on the fertilization of flowers by insects[‡], enters into their structure and adaptations with considerable detail, and with careful analysis, giving examples of several species and full illustrations in typical cases. All follow the same general plan, the individual variations being slight, since the species conform to a type more uniformly than genera usually do, as is also the case with the allied genus *Phyteuma*. The whole arrangement is very curious and interesting, being well planned to secure the designated end. *Campanula aparinoides*, Pursh, does not differ in any essential point of structure from the other members of the genus. The nectar, which is the object sought by visiting insects, is stored in a yellowish, fleshy disk, resting on the pistil and surrounding the base of the style. The disk is nearly covered by the enlarged bases of five filaments, termed "valves" by Sprengel, quite triangular in shape in *C. rotundifolia* and some other species, and rather elongated triangular in *C. aparinoides*. The five free spaces between these "valves" or enlarged bases of the filaments, are themselves nearly closed by interlocking hairs, projecting from the edges of the filaments.[§] In *C. aparinoides* there are also hairs projecting from the inner side of the corolla at its base, and directed inwards towards the filaments. In the bud, and during the early stages of its development, the anthers, like a hollow cylinder, are closely wrapped around the upper part of the style, which is shaped like a hairy, cylindrical brush. The anthers burst along their inner face at this time, and the brush, by means of the bristling hairs, sweeps the pollen out of them pretty cleanly. As they shrivel up and shrink away towards the bottom of the bell-shaped corolla, the style lengthens, bearing the spherical pollen grains with it while the flower is unfolding. The stigmas are still inaccesssible to the pollen, since they form the inner faces of the three-cleft style, the parts of which are closed on one another, and form the cylindrical brush. They soon open and curve backward, exposing their inner surfaces, now turned outward and covered with stigmatic papillæ. As they curve back, they hold the same position in the flowers as did the brush a little earlier. Hence an insect, creeping into the corolla to reach the nectar, rubs off some pollen from the brush of a younger flower and carries it to the stigma of an older one, the parts of the style being curved back in such a way that it cannot, if of any considerable size, avoid brushing off some of the dust and leaving it on the papillose stigmas. In this way, as an insect goes from flower to flower, the ovules of an earlier flower are fertilized by the pollen of a later one.

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[*] Read before the State Microscopical Society of Illinois, Dec. 12, 1890.

[†] Das entdeckte Geheimniss der Natur im Bau und in der Befruchtung der Blumen, pp. 109-112.

[‡] Die Befruchtung der Blumen durch Insekten, und Alpenblumen.

[§] H. Müller, Befruchtung, p. 373.

The older botanists were puzzled to account for the fertilization of these plants. The relative position of the parts was well known to Linnæus and his pupils. In a dissertation by one of them, Wahlbom, entitled, "Sponsalia plantarum," and read at Upsal in 1746, it is stated that certain canals existed in the style to carry the pollen through to the stigmas.* Sprengel remarks that they did not see these canals, but imagined them. It was an effort to bridge a difficulty, and, like many another, broke down when the test was made.

The function of the hairs fringing the bases of the stamens is considered by Müller to be that of keeping useless visitors from the nectar stored in the fleshy disks just within. Strong insects like bees, that are the most common visitors of *Campanulæ*, can push through them and secure the nectar, the nectar-disks being covered by them and the "valves." Weak insects will be kept away. Sprengel looked upon them as contrivances to protect the nectar from the rain, by preventing the entrance of drops of water, but this is thought to be useless by Müller on account of the inverted position of the flowers, actually causing them to be sought by insects as a shelter from rain and dew, and so facilitating their fertilization by these casual visits. But they would not be useless for this purpose in the case of *C. aparinoides*, whose flowers open upward, they being nearly erect on their slender stems.

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* Linnæus, Fundamenta Botanica, 1786, Vol. I, p. 246.

There are plenty of guests, bidden or unbidden, in the flowers of the Marsh Bellwort. Nearly every one has a goodly number of Thrips, (*Palæothrips*, Sp.), crawling about in various parts of it, and busy at something. Sprengel states that they were the only insects he had seen in the species of *Campanula* he mentions, five in all including *Specularia*, but he thought that they could hardly affect fertilization, and that this must be done by some larger insects. Among the insects mentioned by Müller, nothing is said of Thrips. But it seems evident that they may be useful in the case of *C. aparinoides* from a study of the flower and its surroundings. These do not, as already intimated, like species with inverted corrollas, offer shelter to the bees and other insects at night or during rain. Though the flowers are white or bluish-white, they are neither conspicuous nor very accessible, since they are usually down among the blades of grass where they most delight to grow. Sometimes they stretch upward and offer inducements of this kind, which may also be both a cause of superior vigor and a result of insect visitation. But the Thrips are the only insect visitors I find at all common. Others are occasionally seen, small butterflies and moths and bee-like flies, and they not alighting very often. When the Thrips are placed upon a slide and examined, they will be seen to be plentifully sprinkled with spherical grains of pollen, adhering to various portions of their bodies, especially to the antennæ and the body-hairs. They crawl around in the base of the flowers, and over the style and stigmas. They appear too small to go from one flower to another to any extent, and especially from one plant to another, though this is not impossible, since the plants sometimes grow so closely together as to be grasped by the hand and pulled up by the handful. But it is not probable that fertilization is effected in this manner to any degree.

But it may be the office of these tiny insects to effect self-fertilization in flowers that do not often receive visits from larger insects, for whose visits they are, however, functionally contrived. They bring about results which, though inferior, are greatly superior to failure of pollenation. Though the flowers are proterandrous, the round and unbroken grains of pollen are still visible on the outer side of the style some time after its parts have expanded and exposed the stigmatic surfaces. The Thrips will be useful in carrying this pollen across to the other side, and in this way overcome a difficulty which the pupil of Linnæus imagined must be obviated by his supposed canals.

Both the ability and desirability of self-fertilization in case of a lack of insect-visitation have been recognized by Müller and other writers as probable in species of *Campanula*.* He indeed calls it a makeshift (möglichkeit), but as such it is far better than failure in accomplishing the development of seed. He mentions *C. barbata*, L., as an example of this kind, where, if cross-fertilization fails, self-fertilization may take place. The method of securing this is for the parts of the style to curve around till their stigmatic faces come in contact with the lower part of the brush formed by the undivided portion of the style, or by the pollen falling on the stigmas when they are in this position. The parts of the style would have to curve into a circle to bring the two sets of hairs, those on the brush and those on the stigma, into this relation. But they do not appear to curve so far in the flowers of *C. aparinoides.* This condition of affairs also implies that the pollen of a flower is available for its own fertilization when the parts of the style expand and long enongh afterward to allow them to curve to make the required contact. And this is corroborated by finding fresh pollen on the brush and on the Thrips, which, though it might have been brought from other flowers, is more likely to have been left for use by their own anthers. And it seems much easier and more satisfactory to make the Thrips

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" The *Campanulaceæ* have been inquired into by many investigators as a supposed case of necessary self-fertilization, some of whom, Cassini, Treviranus, Hartig, and Gaertner, decide for it; others, Sprengel, Wiegman and Henschel, against. According to my investigations, which, however, are to be extended by more exact experiments, self-fertilization does not take place."—Hildebrand, Geschlechter Vertheilung bei den Pflanzen, p. 64, (Leipzig, 1867.)

pollen carriers than for the parts of the style to curve around and gather their own pollen, functionally intended for the use of other flowers. Viewed in this manner they would not be termed useless guests, or be classed among the insects engaged in petty thefts* (Diebstähle) while busily crawling about among the hairs of the Marsh Bellwort, which they do so easily, but among those lawfully employed in proper work.

II.—*Sabbatia angularis*, Pursh.

This handsome member of the Gentian family is a common plant in many of the damp places of our pine barrens, blooming in late summer and early autumn. But its floral beauty is not its sole feature of attraction. The mechanism to secure cross-fertilization by the help of insects is still more interesting. The flowers, like others of the genus, are proterandrous, and skillfully contrived to secure this end. They have a wheel-shaped corolla, rose-pink in color, very bright and attractive to the eye. At the base of its short tube is a yellow or greenish-yellow spot, shaped somewhat like a star with five short, blunt rays, bordered by a dark red or purple band, contrasting sharply with the general color of the flower. The style is bent downward and outward, bringing it to one side of the flower, or away from the floral axis. It is deeply two-cleft; occasionally three-cleft. In the bud the corolla is dextrorsely convolute. The style and its parts share in the same spiral movement seen in the twisting of the bud, it being sinistrorsely twisted. The two parts of the style face each other, their inner surfaces stigmatic for the greater part of their length and thickly covered with glandular hairs. These parts are closed in the bud, and until after the anthers burst. The bending of the style is in a plane parallel with the cleft, or away from which the two parts of the style would recede at a right angle if they were not twisted. This would leave the stigmas with their edges only presented to the body of an insect at work above or below them, unless they spread considerably, so as to allow it to pass through the fork between them, which is not the case. But the twisting, owing to the length of the parts, tends to hold them together, as a cord is twisted to bind its threads better. Yet it compensates in a measure for this by bringing a good part of the stigma to the upper side of the style, so as to rub against the body of an insect trying to reach the nectar in the most advantageous way. For, in looking at a flower from the outside, the twisting is seen to be towards the left hand. The style makes a turn, bringing that part of the fork axially on the right over to the left. Since the cleft extends about half way down, this part of the fork, in the effort to withdraw from the other and turn at the same time, rolls its inner face upward for a good portion of its length, being still held to the opposite part at the upper end; and turning it wholly upward, except at the tip (which may have turned too far for this), in case it is released. By the same process, the part of the fork axially on the left passes over to the right, much of the inner surface being turned downward. Sometimes the tips of the parts in either case may turn so far as to bring the ends of the stigmas upward or downward, and opposite to the position of their main parts respectively. This is a great advantage, by making the larger part of the stigmatic surfaces easily accessible, since the parts of the style diverge but little when they succeed in separating, for the interlocking is often quite strong. The erection of the style, a characteristic of species of *Sabbatia* in later anthesis, is not a prominent feature of *S. angularis.* In fact, when it occurs, it is of no special advantage for cross-fertilization in this plant, the stigmas being well exposed while the style is turned to one side. Fertilization may thus begin at an earlier stage, with fewer chances of failure, should the parts remain locked together. Besides, the style, being quite stiff, when turned to one side offers a better landing-place to a large insect, by affording more room on one side of the corolla of a flower not very broad.

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* Müller, Befruchtung der Blumen, p. 373.

The object of these visits is to get the nectar stored in receptacles attached to the base of the ovary. These project outward and downward as little swellings, each nectary opposite a petal and to a point of the star forming the eye at its base. Hence they alternate with the stamens, which are of the same number as the lobes of the corolla and opposite its clefts. It is between the filaments that an insect would run its proboscis to reach the nectar-glands, the bright line raised up into blunt points exactly opposite them serving as a guide. The tube of the corolla is about as long as the ovary. The style and ovary are green. The anthers are introrse and adnate, though the point of attachment to the filament is a little above their base, making them slightly versatile, so far at least as to turn back with facility. At the time of bursting they bend back, becoming arcuate in shape and open upward. When an insect lights upon a flower and turns about in the effort to reach the various nectaries, these anthers are favorably situated to leave the pollen on its under side. The stigmas of the flower being closed on one another are not yet in a condition to receive this pollen, except a small quantity which may be left on the few hairs that project from the edges of the cleft. But when an older flower is subsequently visited, it will have its stigmas turned in the proper way for the reception of the grains. Working about the flower to obtain the nectar, all parts of the exposed stigmas are likely to come in contact with some part of the insect to which pollen adheres, and the grandular stigmatic hairs will rub it off and hold it. In this way cross-fertilization will be effectually secured.

The structure and mode of bursting of the anthers is an additional help in this process. By curving they are made stiff, and their walls are stretched. The tissue of the cell-walls is very elastic. While experimenting with the anthers to see how they opened, one was pressed along its sides between the prongs of a pair of forceps. The instrument suddenly slipped, and the shock, or relief from pressure, was so great that the cells burst, quickly throwing out the pollen to quite a distance. Repeating the experiment and imitating the first operation as nearly as possible, others were ruptured in the same manner. Sometimes the elastic force was so great as to nearly empty the cells by a single effort. Doutless an insect will also exert a like pressure, by grasping the anthers with its feet or pressing them between its legs while at work upon the flower, and cause their bursting in a similar way. As a result the pollen will be shot against its body, and more adequately dust it than by a simple act of rubbing against them. The tissues of the cells being stretched and the anthers bent into the form of a bow, as soon as they are unloosed, shoot out their tiny missiles, stored up within, and hit their insect guests, not as enemies, but as agents of the plant in furthering its economy.

III.—*Eleocharis mutata* (L.) R. & S.

This plant was detected during the present season in Wolf Lake, along the eastern border of Chicago, and near the boundry line of Indiana. It grew in abundance but had hitherto escaped the notice of collectors in this vicinity, as I find no allusions to it in this locality. An examination of its flowers showed that they were proterogynous, the protruding style and stigmas being brown and withered while the stamens are still covered by the scales. A further study of the plants showed that the styles appear above the scales just after the spikes have risen out of the water from one to three or four inches. When the plants have stretched upward from six to twelve inches beyond their proterogynous stage, the anthers make their appearance above the scales. The spikes are about an inch in length at first, but increase in length and diameter as they become older, or reach their second stage. Then the anthers burst, and freely scatter the dry pollen about, some of which will lodge on the feathery stigmas. The plant is fertilized by the wind, or even by simple gravity, since the stems are near together, several rising from the same rhizome. The elevation of the spikes when the stamens appear, bringing them above the younger flowers in which the stigmas are ready to receive the pollen, facilitates its reaching them at a level so much below, since it may simply drop upon them. But the wind, either directly or by agitating the water and shaking the stems, must be regarded as the principal agent in the cross-fertilization of the flowers. The inflorescence of the spikes is centrifugal, the older stamens being mostly above. Belated stamens sometimes appear without anthers. They rise above the scales as pale elongations of filaments, a little enlarged at the top.

ENGLEWOOD, CHICAGO.

Variations in the Rootstock of Smilax glauca dependent upon Environment.

On the south beach of Staten Island, at the line of high water, there are often a number of hard, gall-like bodies, lying on the sand. These are sea-worn parts, often single tubers, from the rootstock of the cat-brier, probably in every case from *Smilax glauca*. This species grows on the bluffs that are constantly breaking away, and by this and other means, sections of the rootstock finally reach the beach and are worn by the waves until the tough roots, that have their origin particularly in the tubers, are reduced to spine-like processes.

Smilax glauca not only grows on sandy bluffs and dunes, but also in low land, that for a portion of the year is quite wet. These conditions produce their effect upon the plants, and those occupying the dry and sandy places are not, in every particular, like those that have grown on moister ground. There is not only the usual difference between plants that grow on dry places and on damp ones, namely: a difference in depth of root, but there is also a variation of growth, which is evidently useful and adapted to environment.

The rhizomas of *Smilax glauca* are always tuberiferous, the tubers being occasionally connected to the rootstock at one end only, but generally they are swellings, sometimes of single nodes and sometimes of several nodes coalesced, that form along the rhizoma itself, and are centers of collected nourishment. Many of the upright leaf-bearing branches, as well as the main and more robust roots, are connected with these tubers, and when the tubers consist of several coalesced nodes, the roots grow from them in circles of some regularity, but the coalescence is also plainly seen in some instances, without the aid of the accompanying roots.

The change of growth with change of condition, mentioned above, is especially noticeable in these tubers, which appear to be more numerous on plants growing on dry, sandy stations, to have a greater number of roots starting from them and fewer from the internodal spaces, and also to be often of larger size, than on plants occupying moister situations. This is easily explained, for they have more need of stored moisture and nourishment than those of the low, wet ground. Also in these latter plants the spaces between the nodes are greater than in those occupying the dunes.

WM. T. DAVIS.

An Undescribed Desmodium from Texas and Mexico.

DESMODIUM LINDHEIMERI.—Erect, branching, stout, 2° or more high, conspicuously angled and channeled, downy with a close fine pubescence; stipules more or less persistent, ovate lanceolate, cuspidate, pubescent and reflexed; petioles 1′ or more long; leaflets scabrous or finely pubescent above, reticulate, villous-pubescent and the veins conspicuous beneath, ovate or ovate-lanceolate, 1-3′ or more long, the terminal one mostly somewhat rhomboid, truncate at the base, acutish, the two others inequilateral, smaller and more obtuse; racemes panicled, spreading; bracts ovate-lanceolate, cuspidate, deciduous; flowers purple; calyx bilabiate, the lobes acute and nearly equal; loment 1′ to 1½′ or more long, 4-6 jointed, the joints obliquely oval, about 4″ long and 3″ wide, glabrous with the sutures conspicuously uncinate-pubescent; stipes 1″ or less long.

Monterey, Mexico, Herb. Kew, coll. by Dr. Edwards; (Hemsley Biol. Cent. Am. i., 291,) also in Herb. Torrey (without fruit), determined by Bentham as *Desmodium viridiflorum*, Beck.

New Braunfels, Texas, coll. F. Lindheimer (No. 499). Caracol Mts., Mexico, coll. Ed. Palmer (No. 246). Mts. near Cardenas, Mexico, coll. C. G. Pringle (No. 3289). This plant differs from the typical *Desmodium viridiflorum* (L.) Beck, of the Atlantic Coast States in its angled stems, stouter habit, and the size and shape of the joints of its loment. Those of *D. viridiflorum* are rarely more than 2″ long, semi-rhomboid and uncinate pubescent throughout, whereas those of *D. Lindheimeri* are fully twice that size, obliquely oval, glabrous with only the sutures uncinate-pubescent. In the more recently collected and beautifully prepared specimens of C. G. Pringle the joints are green with the pubescence on the sutures appearing perfectly white. The alliance of Lindheimer's plant is rather with *Desmodium canescens* (L.) D.C. than with *D. viridiflorum.*

ANNA MURRAY VAIL.

Plants of Special Interest Collected at Orono, Maine.

By MERRITT L FERNALD.

Although Orono and vicinity have long been considered among the best collecting fields in Maine, both for the botanist and the entomologist, yet very little has been published concerning our flora. This is doubtless due, in a large degree, to the lack of local botanists. Nearly all who have spent any time here have been connected with the State College, and their necessary duties have left them little time for outside work.

It has been my privilege to spend the past year, 1890—especially from May to August—collecting here. Thinking that notes on some of our less common plants may be of interest, I venture the following. Plants marked * are not recorded from Maine in the sixth edition of Gray's Manual.

Clematis verticillaris, DC. Prof. Lamson Scribner in an article published fifteen years ago, stated that this plant was found in Orono, "growing profusely on rocky banks." It has fast been torn up, until now there are only a few straggling plants left, and these are in constant danger of meeting the same fate.

* *Nymphæa advena*, Ait. f., var. *minus*, Morong, is quite abundant at "Chemo," a pond and stream in Bradley.

Alyssum calycinum, L. Sparingly introduced into grass-land.

* *Papaver Rhaeas*, L. Ever since I can remember, this plant has grown in a field back of the old "White House" at the college. Probably at first escaped from a garden, but it has not failed to make its appearance for years.

Viola palmata, L., var. *cucullata*, (Ait.) Gray. A pure-white form is prevalent in a meadow on the "Old Town road."

* *Viola tricolor*, L. var. *arvensis*, Ging. Sparingly introduced with grass-seed.

* *Hypericum Canadense*, L., var. *minimum*, Chois. A form answering to the description of this is frequent in mossy places.

* *Poterium Sanguisorba*, L. A single plant of this was collected in cultivated ground, in 1889.

* *Epilobium hirsutum*, L. This occurs in at least one garden in Portland as a weed, where I collected it, in 1889.

* *Epilobium strictum*, Muhl. Not infrequent in bogs throughout the state.

* *Ribes nigrum*, L. Escaped into rich soil near the bank of the Stillwater River.

* *Callitriche verna*, L. Abundant in water and wet places, everywhere.

* *Callitriche heterophylla*, Pursh. Not very common.

* *Galium Mollugo*, L. Sparingly naturalized in fields.

Aster Lindleyanus, Torr. & Gray. Recorded only from Mt. Desert, in Maine. Very abundant in dry or moist fields, varying from 6-18 inches in height, and the heads often 1 or 1½ inches across. Our most beautiful species.

Anthemis arvensis, L. Nearly as common as *A. Cotula*, growing in fields and newly sown lawns.

Matricaria inodora, L. Fields, rare. Recorded from Eastport, Maine.

* *Matricaria discoidea*, DC. Abundant at one point on Main Street, south of Orono village. Immigrant from Oregon.

* *Centaurea Jacea*, L. One plant was collected in experimental grass-land.

* *Hypochœris glabra*, L. Experimental grass-land. Scarce.

* *Lactuca hirsuta*, Muhl. Not rare in low woods.

Vaccinium cæspitosum, Michx. There is a small patch of this alpine species on the bank of the Stillwater River, near the village of Upper Stillwater. Especially interesting on account of the altitude; about 100 feet.

* *Vaccinium cæspitosum*, Michx., var. *cuneifolium*, Nutt. Grows in profusion in one part of the pasture back of the college farm buildings. Not previously recorded east of Lake Superior.

* *Lysimachia thyrsiflora*, L. Not rare throughout the State.

Halenia deflexa, (Sm.) Griseb. Quite common in all low woods and pastures.

Veronica arvensis, L. Grows on wet rocks in a lot of woods near Veazie, appearing as if indigenous.

Veronica Buxbaumii, Tenore. Frequent.

* *Mentha sativa*, L. Occurs sparingly near the college farmhouse. Probably introduced with garden seed.

Mentha arvensis, L. Grows sparingly on the bank of the Stillwater River.

* *Plantago Patagonica*, Jacq., var. *aristata*, (Michx.) Gray. A few plants have been collected in grass lands.

Polygonum Careyi, Olney. Very abundant in low or cultivated ground. Recorded from Southern Maine.

Salix balsamifera, Barratt. Stillwater River, near bank.

* *Narcissus poeticus*, L. This plant has grown wild in a field quite remote from buildings, ever since I can remember. It is constantly increasing, new plants springing up many yards away from others.

Juncus Greenii, Oakes & Tuck. This is very abundant in an alder swamp. Of special interest, as it has hitherto been considered a coast plant, while Orono is nearly forty miles from the nearest salt water.

* *Juncus Canadensis*, J. Gay, vars. *longecaudatus* and *subcaudatus*, of Engelmann, are both common, the former growing in swamps and the latter on the sandy shores of a small pond, the procumbent form being very plenty. Coralline tubers were found on many plants of var. *subcaudatus*.

* *Carex aquatilis* × *stricta*, Bailey. This new form occurs in a meadow on the college grounds. It is strange that it has never been noticed before, as it grows on both sides of the main driveway to the college buildings.

* *Carex communis*, Bailey, var. *Wheeleri*, Bailey. In dry woods, but not common.

* *Carex chordorhiza*, Ehrh. (See Bull., Oct., 1890).

* *Carex echinata*, Murray, var. *angustata*, Bailey, and a form approaching var. *cephalantha*, Bailey. Both quite common.

* *Carex straminea*, Willd., var. *alata*, Bailey. Not uncommon along the line of the M. C. R. R. between Orono and Veazie.

Other *Carices* of note found here are: *pauciflora*, Lightf., *Pseudo-cyperus*, L., *Houghtonii*, Torr., *lenticularis*, Michx., *Magellanica*, Lam., *limosa*, L., *flava*, L., Vars. *graminis* and *viridula* of Bailey, *umbellata*, Schk., *deflexa*, Hornem, var. *Deanei*, Bailey, *canescens*, L., var. *polystachya*, Boott., common in ditches, *tenuiflora*, Wahl. *tribuloides*, Wahl., vars. *turbuta* and *reducta* of Bailey, together with sixty others.

Panicum xanthophysum, Gray. Scarce.

* *Danthonia compressa*, Aust. Not rare in dry woods.

Sporobolus cuspidatus, Torr. I found one plant of this in dry soil. Previously recorded from Northern Maine.

Apera spica-venti, Beauv. Not infrequent in dry or cultivated ground.

Poa nemoralis, L. Woods, rare. Recorded from Northern Maine.

* *Poa debilis*, Torr. Probably this species, though Dr. Vasey says the plant appears somewhat like *alsodes*, Gray. Deep mossy woods.

Puccinellia maritima, Parl., var. *minor*, Watson. I collected this rare form at Cape Elizabeth, Me., in 1889. Only two plants were found.

Festuca gigantea, Vill. Not rare by roadsides.

Aspidium spinulosum, Swartz. The typical form is common here in deep woods and swamps.

Ophioglossum vulgatum, L. Quite abundant.

* *Lycopodium*. Prof. D. C. Eaton names it, "*L. annotinum*, L., var. *pungens*, Spring, a form with the fertile branches less leafy, and thus imitating *L. clavatum*, L." Knolls in pasture. Very scarce.

Thus it is seen that Maine has an unusually interesting flora, the discoveries in which may be made almost indefinite in extent, and when there have been further explorations, doubtless many things will be found to occur here which have hitherto been overlooked by the busy people of the "Pine Tree State."

I wish here at least to express my thanks for the assistance so kindly rendered me and the encouragement given by four of our most prominent workers, Drs. Sereno Watson and Geo. Vasey, and Professors L. H. Bailey and D. C. Eaton.

ORONO, Me.

Reviews of Foreign Literature.

La Génération sexuée des Gleichéniacées. N. W. P. Rauwenhoff, (Archives Néerlandaises xxiv. 157–231.)

The Gleicheniaceæ form a group of ferns having no representatives within the United States. They are usually placed between the Osmundaceæ and the other leptosporangiate ferns, and constitute a family of equal rank with the Polypodiaceæ, Schizæaceæ etc. They have been but little studied, and the paper before us is the first account of the prothallium that is at all complete, although the author in 1877 and 1879 published some notes upon them.

In the present paper the author treats at considerable length the germination of the spore and the development of the prothallium and sexual organs, and gives a few very brief notes upon the embryo.

The structure of the spores, and the first phases of germination are treated very minutely, and are briefly as follows: The ripe spores are destitute of chlorophyll, of a yellow color, and possessing a membrane that shows a differentiation into three layers, perispore, epispore, and endospore, none of which are composed of unaltered cellulose.

Shortly after sowing the spores chlorophyll is formed, and the spore membrane is ruptured, allowing the enlarging contents to protrude in the form of a papilla, which together with the rest of the spore contents, is now surrounded with a cellulose wall.

The early stages of the prothallum do not differ in any marked degree from those of other Leptosporangiatæ, resembling, perhaps the Osmundaceæ most nearly, especially in the not infrequent formation of a cell-mass as the first stage of the prothallium. The prothallium usually grows for some time by a two-sided apical cell, which is later replaced by a row of equal marginal initials, as in other ferns. Sometimes, as in the Osmundaceæ, a thickened midrib is formed very early, but usually the thickening is confined to the cushion back of the notch in front, as in the Polypodiaceæ. A tendency to form numerous lateral branches, capable of independent growth, and a multiplication of the prothallia by this means, is shared with the Osmundaceæ.

The development of the sexual organs, especially the archegonium, is not treated with as much care as could be wished. The antheridia, in their development, are midway between the Osmundaceæ and Polypodiaceæ but one or two statements made require confirmation. This is especially true of the statement that chlorophyll is found in the central cell of the young antheridium, as well as in the peripheral cells. This is certainly contrary to what obtains in all other investigated archegoniates, and as figure 58 of the memoir in which this is shown evidently represents a pathological case, as is evident from the collapsed condition of the central cell, the statement is probably incorrect. The account of the spermatozoids is also very confused, and the impression is given that their whole development takes place after the escape of the sperm-cells from the antheridium, which, to say the least, is improbable. At any rate, no account is given of their origin and development beyond a very brief statement of the changes in the appearance of the sperm-cells from the time they are ejected to the escape of the spermatozoids, a period varying from one-quarter to one-half hour.

The development of the archegonium corresponds, so far as the somewhat incomplete account goes, with that of other ferns. The neck, to judge from the figures, as nothing is said in this point in the text, is straight, as in the Osmundaceæ and Hymenophyllaceæ. The number of canal-cells is not given, and no mention is made of a ventral canal-cell, although unquestionably one must be present.

The same vagueness is noticed in his treatment of the embryo. After stating that the first division-wall is slightly inclined to the axis of the archegonium and that the next divisions result in the formation of octants, as in the other Filicineæ, he says: "Peu à peu l'embryon devient un corps globuleux, à petites cellules, dans lequel. . . . . la cellule triangulaire du sommet de la racine est la première à se différencier nettement."

Sometimes more than one embryo will begin to form upon the same prothallium.

A study of the growth of the root confirms Nägeli and Leitgeb's statements as to the origin of the primary tissues of the root, rather than the recent account of Van Tieghem and Doüliot.

While the paper is a valuable contribution to our knowledge of the ferns, it would have been quite as much so if a large part of the very tedious introductory matter were omitted; and it is much to be regretted that the account of the sexual organs and the embryo is not more careful and complete, as a comparison of these with other ferns might be of great value from a systematic standpoint.

DOUGLAS H. CAMPBELL.

Assimilation of the Free Nitrogen of the Air by Leguminous Plants. In the Berichte der deutschen Bot. Gesellschaft of November last, Dr. Frank gives the result of an experiment on *Robinia Pseudacacia*. The soil for this purpose was pure quartz sand, first heated, then washed with water containing hydrochloric acid, then with pure water. To this was added a solution of nourishing material of a certain known composition, afterward the pots holding this prepared soil were placed in a steam sterilizer and heated for several hours. A slight quantity of soil, taken from the earth where *Robinia* trees grew under ordinary conditions, was then placed in each pot. This was to supply the young plants with germs of the supposed bacteria. Seeds were then sown, a single one in each pot, and the resulting plants kept in the hot-house and watered with distilled water. After the growth of a single summer the plants were examined and subjected to chemical analysis. All had developed the little tubers supposed to be caused by bacteria, and there were found in different conditions, some entirely emptied of contents, others yet tense, and hard with all intermediate stages. The chemical analysis showed the quantity of nitrogen contained in the plants to be something more than thirty-eight times that contained in the seeds. This nitrogen could have been obtained from no other source, it is claimed, than the free nitrogen of the air. In order to show more clearly the function of the tubers and their connection with the bacteria germs, a few pots were prepared without the earth from outside, but allowed to stand in the same room with the others. These plants also developed tubers, though less in number and less well developed, which Dr. Frank says could have come from no other source than the germs escaped from the other pots. Various precautions were taken to avoid this infection, such as covering the surface with cotton, etc., but the simpler method of removing the pots from the atmosphere surrounding the infected plants seem not to have been tried.

E. L. G.

Recherches sur la Vrille des Passiflores, par M. W. Russell. (Bull. Soc. Bot. de France, xxxvii. 189-192).

The rameal nature of the tendrils of the Passifloræ is well known, but their origin is a source of considerable discussion among botanists. According to various authors there exists in the axils of the leaves two or three organs, of which one represents the axillary branch, whereas the others are either accessory ramifications, or normal ramifications of the same or of a different order.

In this study of the tendrils of the Passifloræ, the author takes *Passiflora holosericea* as a type and observes—1st, a tendril it the axil of the leaf; 2nd, two floral pedicels *b* and *c* on either side of the tendril, but slightly behind it; 3rd, a leaf-bearing branch, and *a* situated between the tendril and the stem. Of all these organs the first to develop is the tendril, and when that has attained a certain size, a second bud appears in the angle of the tendril and the stem, which bud developes into the leaf bearing branch *a* and after that are formed successively the buds *b* and *c*, one at the right and the other to the left of the base of the tendril. It is to be noted that neither of these three buds possesses an axillary leaf, or even a rudimentary one.

The conclusions reached are that the tendril of the Passifloræ represents a modified axillary branch that can have at its base several secondary branches destitute of axillary leaves. The branch representing the first ramification is always developed, and produces either a branch with leaves which replaces the axillary branch transformed into a tendril, or a flora pedicel, either simple or branched. The other branches that are in the flowering portion of the plant become plural pedicels, or are only partly developed, or remain undeveloped. A. M. V.

Sulle foglie delle Piante acquatiche e specialmente sopra quelle della Nymphæa e del Nuphar. Nota di G. Arcangeli. (Nuovo Giornale Bot. Ital. xxii. 441).

In the above study on the structure of the leaves of *Nymphæa* and *Nuphar* the terms *idrophylli*, *æridrophylli* and *ærophylli* are suggested to designate respectively the submersed, floating and ærial leaves of aquatic plants. Under the group of *idrophylli* Sig. Arcangeli proposes to unite all the leaves that present structures adapted to thrive totally under water as do the leaves of the *Zosteraceæ*, some *Potamogeton*, *Vallisneria*, *Elodea*, etc.; under that of *æridrophylli* all the forms that float on the surface of the water, as in *Nymphæa* and *Nuphar*; and under the name of *ærophylli*, those that grow above the surface of the water, as do the leaves of *Sagittaria* and *Limnobium Spongia*.

A. M. V.

Key to the Genera and Species of British Mosses. Rev. H. G. Jameson. (Journ. Bot. xxix., 33-45, plate 302).

Beginners and students of mosses who do not recognize genera at sight will find this a useful guide, while even more advanced students will appreciate the ingenuity by which the key and its explanation is made to serve as an illustrated glossary. The terms used are as simple as accuracy will allow, and the key permits the analysis of sterile as well as fruiting specimens. The genera of the Hypneæ are separated, thus forcing a beginner to recognize differences which are as clear as those which separate genera of acrocarpous mosses. E. G. B.

Index to Recent Literature relating to American Botany.

Allamanda grandiflora. (Garden, xxxix. 192, 193, Pl. 794).

Anthracnose of Cotton. E. A. Southworth. (Journ. Mycol. vi. 100-105, Pl. iv. and figs. in text).

A new species is described and figured in this article, *Colletotrichium Gossypii*, which was originally distributed in Ellis' North American Fungi, as *Glæosporium carpigenum.*

Anthracnose of the Hollyhock—Additional observations on. E. A. Southworth. (Journ. Mycol. vi. 115, 116).

Reference is made to the apparent fact that this fungus was described in 1854 by Braun and Caspary as *Steirochæte Malvarum*, and the name *Collectobrichium Malvarum*, (Br. and Casp.), must therefore stand for it. The author also notes that *S. graminicola*, (Ces.) Sacc. may be identical with *C. Bromi*, Jennings, an undescribed species on *Bromus secalinus.*

Arbor-vitæ—The Western. (Gard. and For. iv. 109, 110, fig. 23).

A description of *Thuja gigantea*, with illustration of base of the trunk and account of the confusion in its nomenclature with *Libocedrus.*

Aster macrophyllus. (Gard. and For. iv. 88, 89, fig. 18).

Blackberry Rust—Perennial Mycelium of the Fungus of. F. C. Newcombe. (Journ. Mycol. vi. 106, 107, Pl. v, vi).

Description and representation of *Cæoma nitens.*

Black Knot of Plum and Cherry Trees. Byron D. Halstead. (Bull. No. 78, N. J. Agric. Enp. Sta., illustrated).

This is an appeal for the destruction of such trees or parts of trees as may have become infested with this fungus (*Plowrightia* *morbosa*). The wild as well as the cultivated species of *Prunus* seem to be susceptible to it, and heroic treatment by knife, axe and fire, is urged.

Buffalo Berry—The. (Vick's Mag. xiv. 87, 88, illustrated).

Contains a figure of fruiting branch of *Shepherdia argentea.*

Cnicus Hillii. Wm. M. Canby. (Gard. and For. iv. 101).

Description of a new species, allied to *C. odoratus*, from the borders of Lake Michigan.

Coscinodisceæ—The. Notes on Some Unreliable Criteria of Genera and Species. J. D. Cox. (Reprint from Proc. Am. Soc. Micros., Thirteenth Ann. Meeting, 1890; pp. 184-204, illustrated).

This article is primarily a protest against the unnecessary multiplication of Diatom species founded upon insufficient characteristics or hasty observations. Darwin is quoted to the effect that "one expert has made no fewer than thirty-seven species of one set of forms which another arranges in three." The author gives his conclusions in regard to the genus *Coscinodiscus*, which, if his views are correct, will materially diminish the number of its species; although *Actinocyclus Ehrenbergii* is included. The paper is vigorously written, and some of the sentences are worth quoting for the benefit of others besides diatomists. Thus he says: "Instead of waiting for fuller knowledge, observers have run headlong races to publish new genera and species upon a single specimen, or even fragment of a specimen." He also has evidently no great confidence in the artificial keys which have been published—describing them as complicated and delusive—and finally says: "I venture to say that no living student in this department can be sure that he has a new species, (much less a new variety) before him. The impossibility of being certain leads an observer to solve his doubts in favor of his own discovery, and the same object is named and renamed." Coming as this does in connection with the author's other paper on "Deformed Diatoms," we have an exceedingly interesting and timely contribution. A. H.

Cycadinocarpus Chapinii. (Trans. Meriden Sci. Assn. iv. 62, illustrated).

Description and figure of a new species, the discovery of which was announced in the Transactions for Jan., 1886.

Dewberries—More About the. L. H. Bailey. (Am. Gard. xii. 82–84, figs. 1, 2, 3).

A new variety is figured and described, viz: *Rubus Canadensis*, var. *invisus*, in regard to which the author says: "This variety grows in open woods here at Ithaca, where it looks very different from either *Rubus Canadensis* or *R. villosus.* Professor Dudley, who has given it considerable attention, thinks that it may be found to possess sufficient distinctness to make it worth specific rank. It is certainly more unlike the type of *R. Canadensis* than is the var. *roribaccus.* There is a key at the end, in which the author makes three divisions of our *Rubi*, viz.: Dewberries, Blackberries and Raspberries, and compares the wild with the allied cultivated varieties.

Diatoms—Deformed. J. D. Cox. (Reprint from Proc. Am. Soc. Micros. Thirteenth Ann. Meeting, 1890, pp. 178-183, illustrated).

Abnormalities or sports are described in the genera *Navicula, Triceratium, Biddulphia, Eunotia, Licmophora, Rhaphoneis, Cymatopleura, Grammatophora, Mastogonia, Stictodiscus, Coscinodiscus, Arachnodiscus, Actinoptychus, Amphitetras, Epithemia* and *Nitzschia.* The author hints at the possibility of abnormalities in structure being more common than generally supposed and that where such abnormalities result in symmetrical markings or outlines new varieties or species may be described from them. In conclusion he says: "Consideration of this sort may assist us in reducing the enormous catalogue of species in the Diatomaceæ, a consummation devoutly to be wished."

Disease of Geraniums. B. T. Galloway. (Journ. Mycol. vi. 114, 115, illustrated).

From preliminary observations the conclusion is reached that this disease is the same as that reported from France, which is said to be caused by a *Bacillus* and which has received the provisional name of *B. caulicolous*, Pr. and Del.

European Aliens in America. D. T. A. Cockerell. (Journ. Bot., xxix. 76–78).

The following species are mentioned: *Ranunculus acris*, *Nasturtium officinale*, *Capsella Bursa-pastoris*, *Saponaria Vaccaria*, *Malva rotundifolia*, *Trifolium pratense*, *T. repens*, *T. hybridum*, *Medicago lupulina*, *M. sativa*, *Sonchus oleraceus*, *Arctium Lappa*, *Chrysanthemum Leucanthemum*, *Convolvulus arvensis*, *Plantago major*, *P. lanceolata*, *Chenopodium album*, *Polygonum aviculare*, *P. Convolvulus*, *Cannabis sativa*, *Phalaris Canariensis*, *Phleum pratense*, *Setaria viridis* and *Dactylis glomerata*.

Ferns—The Geological History of. Edward Orton. (Journ. Columbus Hort. Soc. v. 96, 97).

Abstract of address at meeting of Oct. 25th, 1890.

Ferns—The Multiplication of. Freda Detmars. (Journ. Columbus Hort. Soc. v. 97–99, Pl. vii).

Contains full page representation of *Camptosorus rhizophyllus.*

Field Notes.—1890. Erwin F. Smith. (Journ. Mycol. vi. 107-110).

These are a series of notes or memoranda upon Peach Leaf Curl, (*Taphrina deformans*); Plum Taphrina, (*T. Pruni*); Plum Blight; Apple Blight, (*Bacillus amylovorus*); Pear Leaf Blight, (*Entomosporium maculatum*); Black Rot, (*Læstadia Bidwellii*); Vine Blight, the effects of which, in some places, were popularly attributed to lightning; Brown Rot of the Peach, (*Monilia fructigena*); Peach Yellows and the Peach Rosette.

Flora of the Great Falls Coal Field, Montana—The. J. S. Newberry. (Am. Journ. Sci. xli. 191-201, Pl. xiv.)

In this paper the author describes the following seven new species, all figured: *Chiropteris Williamsii*, *C. spathulata*, *Zamites apertus*, *Baiera brevifolia*, *Cladophlebis angustifolia*, *Sequoia acutifolia* and *Podozamites nervosa.* Dr. Newberry also discusses the relationship existing between the Great Falls beds, the Kootanie Group of Canada, the Kome Group of Greenland and the Potomac Group of Maryland, with the conclusion that they are all Cretaceous and antedated the Amboy clays, Dakota sandstones and Laramie Group which followed in the order named.

A. H.

Flora of Richmond County, N. Y.—Additions to the. Arthur Hollick. (Proc. Nat. Sci. Ass. S. I., Jan. 10, 1891).

Among the nineteen additions noted the members of the

Torrey Botanical Club are credited with having found seven, during the several field day excursions to Staten Island.

Fossil Woods and Lignites from Arkansas—Description of. F. H. Knowlton. (Reprint from Ann. Rept. Geol. Surv. Ark. for the year 1889; ii. 249-267, Pl. ix., x., xi.)

In this paper the author has given us still further proof of the value of his microscopic examinations of fossil woods. The specimens in question are from the Eocene Tertiary of Arkansas and the following are described and figured as new species: *Cupressinoxylon Arkansanum, C. Calli, Laurinoxylon Branneri* and *L. Lesquereuxiana.* A. H.

Leptothyrium periclymeni, Desm. J. B. Ellis and B. M. Everhart. (Journ. Mycol. vi. 116).

Note upon a new variety of this species (var. *Americanum*) on a *Lonicera* found in Ontario, Can.

Mina lobata. (Garden, xxxix. 144, 145, Pl. 792).

Notes on North American Trees—XXIV. C. S. Sargent. (Gard. and For. iv. 100).

Memorandum upon the difference between *Hypelate trifoliata* and *H. paniculata*, which latter the author shows should be known as *Exothea paniculata*, Radlk. There is also brief reference to *E. Copallilo.*

Orchids of New England—The Native. Walter Deane. (Am. Gard. xii. 152–157, figs. 1, 2, 3, 4, 5).

The following species are figured: *Habenaria fimbriata, H. dilatata, H. tridentata, Liparis liliifolia, Calypso borealis* and *Aplectrum hyemale*, the figures being taken from Mr. Baldwin's work on the same subject.

Passiflora racemosa. (Garden, xxxix. 168, 169, Pl. 793).

Pear Disease—A New. B. T. Galloway. (Journ. Mycol. vi. 113, 114).

Note upon *Thelephora pedicillata*, which is also said to be found upon such widely separated genera as *Quercus coccinea* and *Sabal Palmetto.*

Plants which Grow About Lynn, North Carolina. E. H. Horsford. (Gard. and For. iv. 86).

Prunus ilicifolia, var. occidentalis. Geo. B. Sudworth. (Gard. and For. iv. 51).

There has been trouble in regard to the correct nomenclature of this plant, due primarily to what was probably a mistake of Mr. W. S. Lyon, who published the first account of it and referred it to *Prunus occidentalis*, Nuttall, a name which subsequent research has failed to find in Nuttall's writings. T. S. Brandegee and C. S. Sargent agree in referring it to *P. ilicifolia*, Walp. var. *occidentalis*, (Lyon) T. S. B. The author now calls attention to the fact, however, that this name was applied by Swartz in 1800 to a West Indian species of the genus, which would debar its use for the plant in question, and this leaves it without any name. That of *Prunus ilicifolia*, var. *integrifolia* is therefore proposed.

Puccinia and Phragmidium—The Relationship of. G. De Lagerheim. (Journ. Mycol., vi. 111-113).

Rhamnus Californica and its Allies. Katharine Brandegee. (Zoe, i. 240–244).

Sarcodes sanguinea, Torr. F. W. Oliver. (Annals of Bot. iv. 303–326, 5 plates).

Prof. Oliver has made an exhaustive study of the "Snow-plant" of California from specimens collected near San Bernardino, by Messrs. Godman and Elwes. The vegetative and reproductive organs are described in detail. The roots were found to be densely covered with fungal mycelium, forming a mycorhiza, resembling that found on those of *Monotropa*, with which genus the plant is otherwise compared. Both are regarded as saprophytes or humus plants.

Sleepy Grass—The. V. Havard. (Gard. and For. iv. 111).

Describes the narcotic effect of *Stipa viridula*, var. *robusta* on horses.

Sphenophyllum—The Genus. J. S. Newberry. (Reprint from Journ. Cinn. Soc. Nat. Hist., Jan. 1891, 212–217, Pl. xix).

Dr. Newberry discusses the probable affinities of the genus *Sphenophyllum*, and concludes that it represents a peculiar and extinct family whose nearest relative is *Equisetum*. The fact is also pointed out that as early as the year 1853 the author described and published his ideas relative to the undoubted unity of the genera *Asterophyllites* and *Sphenophyllum*—the former representing the submerged capillary leaves, and the latter the broad emerged leaves of the same plants, although subsequent authors failed to note the priority of these views while laying claim to the same observed facts. Six species from American localities are described. The illustrations are designed to show the diversity in the vegetative organs. A. H.

Spiraea Aruncus. (Garden, xxxix. 185, figure).

Sporophyte—Sexual Immobility as a Cause of the Developement of the. Conway MacMillan. (Amer. Nat. xxv. 22–25).

The Forest in one of its Relations to the Orchard. Byron D. Halsted. (For. Leaves, iii. 68-70).

In this article the author points out the connection between the "cedar-galls" and the accompanying rusts or smuts by which they manifest themselves on the trees of the orchard. The "black knot" also receives attention.

Uredineæ and *Ustilaginæ—Notes on certain.* F. W. Anderson. Journ. Mycol. vi. 121–127).

Notes are given under the genera *Æcidium*, *Puccinia*, *Triphragmium*, *Uromyces*, *Entyloma* and *Uredo*. *Æcidium Palmeri* is described as a new species, and *Puccinia Windsoriæ*, Sch., var. *australis*, as a new variety.

Uredineæ and *Ustilagineæ—New Species of.* J. B. Ellis and B. M. Everhart. (Journ. Mycol. vi. 118-121).

Eleven new species are described under the genera *Schrœteria*, *Schizonella*, *Ustilago*, *Æcidium*, *Uromyces* and *Puccinia*.

Uromyces auf Glycyrrhiza in der alten und in der neuen Welt.—Ueber des Auftreten eines. P. Magnus. (Ber. Deutsch. Bot. Gesell. viii. 377-384; one plate).

Ustilago from Florida—A New. J. B. Ellis and F. W. Anderson. (Journ. Mycol. vi. 116, 117).

Ustilago Nealii is described as new.

Wild Fruits—Promising—IV. A. A. Crozier. (Am. Garden, xii. 16-20).

Notes upon *Amelanchier Canadensis*, var., *Morus rubra*, *Gaylussacia*, sp., *Vaccinium*, sp., *Juglans nigra*, *J. cinerea*, *Hicoria ovata*, *H. sulcata*, *H. Pecan*, *Corylus Americana* and *C. Avellana*.

Winter Aspect of Trees. J. Walton. (Vick's Mag. xiv. 76–79, illustrated.)

In this article we have pictures meant to represent the leaf forms and branching of *Quercus alba*, *Q. coccinea*, *Q. tinctoria*, *Ulmus Americana* and *Pyrus Malus*.

Proceedings of the Club.

WEDNESDAY EVENING, FEBRUARY 25TH.

The Vice-President, Dr. T. F. Allen, in the Chair and twenty-three persons present.

Miss Jeannette Clenan and Mrs. J. K. Cilly were elected active members.

Dr. Rusby and Dr. Morong were appointed delegates to represent the Club at the proposed conference of members of the scientific societies of New York City.

Reports were received from the Committee on Instruction and from the Field Committee of 1890.

Dr. Britton remarked on a *Vaccinium* observed by him on the excursion of July 4th. to High Point, N. J., which appears to be *V. Pennsylvanicum*, var. *nigrum*, Wood. He stated that the same plant had been collected and repeatedly observed on the Pocono plateau of Pennsylvania by Dr. Porter, and that it was pretty clearly a distinct species. He also alluded to *Vitis Solonis*, Planch., collected by Dr. Porter at Easton, Penn., and *Vitis Virginiana*, Munson, recently described from West Virginia, two grapes not alluded to in recent manuals of botany, but which claim recognition as species or varieties. *Vitis rupestris*, Scheele, a southwestern species, has been found by Dr. Porter in southern Pennsylvania.

TUESDAY EVENING, MARCH 10TH.

Dr. Thos. Morong in the Chair and thirty persons present.

Dr. Washington Matthews of Fort Wingate, New Mexico, was elected a corresponding member.

Dr. Britton delivered the announced lecture for the evening on "Grasses." The address was profusely illustrated by lantern slides.

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BIOGRAPHICAL INDEX

OF

BRITISH AND IRISH BOTANISTS,

BY

JAMES BRITTEN, F.L.S., and G S. BOULGER, F.L.S.

(*See review in this number of the* BULLETIN.)

This Index, which has been published in the numbers of the "Journal of Botany" for the last three years, and which is now nearly completed in its serial issue, has elicited much more general interest than its compilers expected.

During its progress through the pages of the Journal, the authors have made numerous additions to the information given, and some corrections. The list of names has also been considerably extended, and will be brought down to the end of 1890. They have been encouraged to think that a reprint of the list, embodying these additions and corrections, would be convenient for those who find it somewhat difficult of consultation in its present form, and would also serve as a handy volume of reference for others specially interested in Botanical Biography.

The plan of the work, as readers of the "Journal of Botany" will be aware, has been to be liberal in including all who have in any way contributed to the literature of the science, who have made scientific collections of plants, or who are known to have otherwise assisted in the progress of Botany, exclusive of pure Horticulture. Where known, the name is followed by the years of birth and death, and in other cases an approximate date is given. Then follows the place and day of birth and death, the place of burial, chief titles, dates of election to the Linnaæn and Royal Societies, or chief University degrees. In conclusion, reference is made to the chief sources of further information, in which Pulteney, Rees, Pritzel, Jackson, and the Royal Society's Catalogue are first quoted, and then the fullest known record, with a note of any portrait and of genera dedicated to the various persons catalogued, or, in the absence of genera, of species. Some estimate of the extent of the work may be gathered from the fact that in its serial form it comprises nearly 1700 names, and this number will be largel increased in the reprint.

The volume will be bound in cloth, and will be issued at 4*s.* (postage paid) per copy, to subscribers whose names are received before publication, the published price being 6*s.* 6*d.* The printing will be begun early in 1891, and the book will be issued in the course of that year. Only 500 copies will be printed. Intending subscribers may send their names to

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BULLETIN
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EDITED BY

NATHANIEL LORD BRITTON,

AND OTHER MEMBERS OF THE CLUB.

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BULLETIN
OF THE
TORREY BOTANICAL CLUB.

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Common and Conspicuous Algæ of Montana.

By F. W. Anderson and F. D. Kelsey.

Batrachospermum moniliforme, Roth. Common in cool springs and streams of the mountains and plains throughout the State. Extremely variable in the gross shape, size and color, as well as in microscopic characters. The plant may be found in favorable situations nearly all the year. It arises from a slippery substratum covering the surface of submerged sticks and stones, and mixed more or less evidently with carbonate of lime: this substratum resembles closely to the unaided eye, the expanded, active plasmodium of some myxogaster. The moniliform stems arising from this are usually clustered or gregarious. Specimens, varying from one to ten inches long, and from nearly simple to copiously branched, may be collected in good fruit from May until September, according to locality. The fruit glomerules frequently send out stems which have, under personal observation, grown to a length of nearly two inches, branching several times, and starting whorls of lateral branch nodes, the filaments from which became from one to four cells long. Is it not possible that a fruit glomerule may sometimes separate from the parent plant, drift into a sheltered place and there send out branches which finally develop into a perfect plant, without any further sexual action, while the glomerule itself becomes the thickened foot holding the plant in position? The first three varieties of these species, as given in Wolle's Fresh-Water Algæ, p. 57, may all be found with the type with us, according to the locality, and there seems to be no necessity for their separation.

We may expect to find *B. vagum*, Ag., or one of its forms, as Dr. C. L. Anderson has found a variety in California. Dr.

Anderson said in a letter several years ago to one of the writers, that he had never seen a typical specimen of *B. vagum* from this country, but had specimens from Europe. But Mr. Wolle, in Fresh-Water Algæ, on p. 57, says that typical specimens are to be found in Maine and Canada.

Chantransia violacea, Kg. var. KELSEYI. Anderson, new var.

Tufts dense, frequently hemispherical, usually solitary, blackish-green, glossy, drying dull on paper, and fading to dark olivaceous; one to about two lines high. Filaments straight or slightly curved from the base, smooth, dilute green to pale olive green; branches ascending or almost erect, the ends obtuse, frequently rounded and slightly swollen, and occasionally somewhat elongated, 4-8 μ wide, by 33-55 μ long. Fertile branches commonly shorter; carpogons 6-10 μ wide by 10-14 μ long. On the wet wood-work of a mill race, and on stones in shallow water, Great Falls, Montana, March, 1887.*

Enteromorpha intestinalis (Linn.), Link, var. *prolifera*, Ag. Very abundant in the Upper Missouri River, and clear, cold mountain streams tributary thereto. Found in these streams at an altitude of 6,000 feet. At first filamentose, arising from a densely interwoven base formed of similiar threads attached to stones, finally becoming inflated and sparingly branched, rising to the surface and floating in free masses. The individual fronds frequently attain a length of eight feet. May be found all the year, but most abundant in spring and summer. See Wolle's Fresh-Water Algæ, p. 338.

Draparnaldia glomerata, Ag. Abundant in all of our clearer streams and springs, attached to sticks and stones. At first bright green, and forming in roundish masses, firmly attached to the substratum, after the manner of a Nostoc; later becoming watery by the partial dissolution of the amorphorus gelatinous sheathing mass, and floating free on the surface of the water, or caught around the stems or leaves of submerged living plants. June to October.

Draparnaldia plumosa, Ag. A small but remarkably robust specimen was found attached to a small pebble in an arm of the

---

*The general appearance of this plant is similiar to that of small specimens of *Tolypothrix pulchra*, Kg., which it was taken to be, until last year, when I had occasion to compare my species of Tolypothrix microscopically, and made this discovery.—A.

furiously flowing Giant Spring on the bank of the Missouri River, near Great Falls. Several main stems arose from a common swollen foot, and branched freely above; a dark sap-green when taken from the water, but drying considerably lighter on paper. This is the only specimen, thus far, reported from Montana, and, like specimens collected by Dr. C. L. Anderson, in California, and others from Connecticut, collected by Dr. W. A. Setchell, it is very distinct in habit of growth and in general appearance from any of our specimens of *D. glomerata*, in which latter the stems and branches are all immersed in a gelatinous substance, more or less firm and dense, according to the age of the plant, which binds them into a glomerule varying from the size of a small pea up to that of an English walnut. In *D. plumosa* the plant has the slippery envelope so modified as to leave every part free, and the general habit of growth in our specimen was similiar to that of reduced forms of *Batrachospermum moniliforme*, but the other specimens referred to were weaker and more diffuse. Giant Spring, banks of the Upper Missouri River, near Great Falls, Montana, September, 1885.

Stigeoclonium tenue, Kg. Habit of growth and general appearance similiar to that of small specimens of *Cladophora callicoma*, but of a brighter green color. Common all over the State. In sheltered nooks it may be found flourishing in winter, but most abundant from the middle of May till the middle of July, and by the end of the month it has pretty well disappeared.

Chætophora pisiformis (Roth), Ag. Found but once and then attached to dead twigs in a pool of cold water, collected from a spring in a dark ravine, at an altitude of about 7,000 feet, in the Belt Mountains, July, 1886. In these specimens, the thallus was half an inch in diameter, and sub-globose.

Chætophora endiviæfolia, Ag. This beautiful species is common all over the State, but especially so in those parts of the Upper Missouri River, and its more sluggish tributaries having muddy bottoms. It grows chiefly in shallow water near the shore, and is at first attached to stones. May be found in winter, but is at its best during July and August.

Cladophora fracta, Kg., var. *gossypina*, Kg. Common in ponds, sloughs, and in slow-flowing spring water somewhat impregnated with alkali. At first attached to the substratum; finally rising and floating free in large, silky, yellowish masses. The individual filaments are very sparingly branched, and *en masse* look more like a *Spirogyra* than like a *Cladophora*. July to September, but at its best in the middle of August.

Cladophora crispata, Kg. Very abundant in shallow ponds and sloughs bordering the Prickly Pear Creek in the Prickly Pear Cañon. Floating in dark green, spongy, elastic masses of less or more curly, interwoven, and much-branched filaments, which spring out to their normal form after the water is squeezed from them, just as sponges do. Collected but once, and then in a luxuriant condition, April 19, 1887.

Cladophora canalicularis, Kg. This common species was collected but once and then at the first rapids of the Great Falls of the Missouri River. The specimens had been cast ashore. They were about ten inches long, strict and rather brittle; the lower half was very dense and compact, being made up of shorter stems and branches arising from the hard, blackish, somewhat calcareous foot. Filaments pale yellow. October, 1886.

Cladophora callicoma, Kg. Plentiful in the rapids of the Upper Missouri River, in the vicinity of the city of Great Falls. This is probably one of the most beautiful species of the genus; but is usually so large and so copiously and intricately branched that a perfect specimen cannot be arranged on a standard-sized herbarium sheet. Forming in ropes three to ten feet long, gracefully undulating in the flowing water and waving its beautiful lateral branches. See Wolle's Fresh-Water Algæ, p. 339. This species was first observed by us in August, 1884—when it was very abundant. Then a dam was built across the river just above the rapids and the disturbance caused the destruction of the plants. In 1886 it reappeared and although excellent specimens were collected as late as October, they did not compare with the luxurient growth of 1884. The plant is now regaining its vigor and may be found in good condition from July until the end of October.

Cladophora glomerata, Kg. Common throughout the state. May be found in good condition from the middle of June till the end of September. The following varieties also occur:

Var. *genuina*, Kirch, is plentiful in all pure, cool, rapid waters of the state; found in the mountain streams, at the altitude of 8,000 feet. Same duration as the species.

Var. FILAMENTOSA, Anders. and Kelsey n. var. Similar to the last but easily distinguished by the more or less numerous elongated simple or sub-simple filaments rising above the other branches and crowned by several to many short-fasciculate to sub-corymbose penicillate branchlets. Plants bright green, 1 to 6 inches high, arising from a calcareous foot, which adheres strongly to the rocky substratum. Cataracts of the Missouri and other rivers of the state; also at Niagara Falls (Wolle), June to October.

Var. *pumila*, Bailey. Frequent on wet wood-work of flumes and races at the city of Great Falls. This pretty little variety grows like a miniature bush, dark green in color, changing with age to a dull dirty green. None of our specimens are over half an inch high. August to November.

Vaucheria sericea, Lyngb. Abundant everywhere. Delights in covering the flat stones and bed-rock of turbulent streams, appearing like big patches of a dense, bright green turf. Also grows in the mud along the margins of springs. All the year round, but at its best from July to December.

Vaucheria sessilis (Vauch), D.C. var. *cæspitosa* (Vauch), Ag. Very common on muddy bottoms of irrigating ditches and on the wet ground bordering creeks and springs. July to October.

Volvox globator, Linn. This curious and beautiful plant is found abundantly in ponds and slow streams throughout the state, all summer.

Protococcus viridis, Ag. and several forms or varieties (?) found everywhere on trees, logs and on the stems of dead herbaceous plants. One form is particularly partial to charred wood of any kind, on which it forms into numerous families by sub-division, appearing like roundish grains or masses of greenish pollen to the unaided eye.

Hydrurus fœtidus (Vill.), Kirch. Very abundant in the Prickly Pear Creek, in Prickly Pear Cañon. Collected but once, April 19, 1887. Specimens vigorous. As many as twenty-seven distinct main stems were counted rising from a common disk of attachment. Plants from six to eighteen inches long, olivaceous, very slippery and of a rank odor—like some of the offensively strong-smelling marine algæ. Flavor like kelp, but stronger and nauseating.

Var. *Ducluzelii*, Ag. has been found only in the Giant Spring, near Great Falls. The first specimens were collected September 28, 1885, in a very rapid arm of the spring. They were plentifully attached to imbedded stones. The largest specimen was three and a half inches high and none have been found so large since; the average height seems to be from an inch and a half to two inches; very dark green and olive-tinged, which shows more decidedly in dried specimens. This plant seems to appear only every other year; from August to October.

In connection with this form attention is called to page 337 of Wolle's Fresh-Water Algæ of the United States, whereon is mentioned a plant that might possibly be a form of *Gelidium corneum*, Lam. Only a scanty supply was collected, although it was fairly abundant at the time. This form has been carefully examined by Drs. Setchell and Farlow and by us, and the conclusion now is that it is merely a condition of *H. fœtidus* var. *Ducluzelii*, in which the lateral branches, usually so liberally clothing the main stem, have not been developed. The microscopic structure of the two forms is practically the same.

TETRASPORA GIGANTEA, Anders. and Kelsey, n. sp. Thallus attached to stones by the attenuate base, tubular or sometimes filled with an amorphous semi-fluid jelly which contains a few cells or none; cylindrical; end slightly tapering and rounded, or extended gradually into a long, slender, rounded point, one-eighth of an inch in diameter; one to ten feet long, diameter from a slender thread to an inch and a half in the broad part, according to length and age of thallus: Cells 10–17μ diameter, average size about 16μ. Thallus bright green, becoming dilute green with age, smooth, very slippery, and easily ruptured.

This species differs from *Tetraspora cylindrica*, Ag. in its much greater size, in its remarkably conspicuous, gregarious habit, in the attenuate base and rounded apex and in the tendency to form cells throughout the diameter of the thallus as well as in having for a constant habitat the swift, turbulent mountain streams. The diameter of the cells is about the same in both, sometimes a little larger in ours, but the other features are so different that we feel safe in describing it under the foregoing name. Belt River in the cañon and in other streams of the Belt mountains and main range of the Rockies, from 5,000 to 8,000 feet altitude. June to September. See Wolle's Fresh-Water Algæ of the United States, p. 339.

T. GIGANTEA var. SOLIDA, Anders. and Kelsey n. var.

Thallus firmly attached by a broad or rarely narrowed base, usually tapering from the base to the blunt point; firm, solid throughout, or hollow only below, pliable and slightly elastic, can be cut in slices with a penknife, and can be carried in the hand and trailed along the ground like a quirt; usually covered outside with silica or possibly fine sand; glaucus outside, dark green inside and paler towards the centre, where the cells are not so crowded; one to six feet long, with a diameter of one inch or less at the base.

This remarkable alga invariably grows on flat bed rock in the "dead water" just below the ripples, and near the edge of the stream. Like the species, may be found from June to September; Belt River, in the cañon, Belt Mountains.

Tetraspora cylindrica, Ag. Occasionally found in rills from slow-flowing springs. Slender, attenuate pointed, six inches to a foot long, bright green, slippery; often attached to dead submerged twigs. July to October.

Tetraspora lubrica, Ag. Very common in quiet springs and slow streams throughout the State. A quite variable species. June to October.

Spirogyra quinina (Ag.), Kg. Common everywhere in a vegetative condition, all the year round. We have neither caught it in conjugation nor in fruit as yet.

Zygnema insigne, Kg. Common in stagnant and slow waters. Abundantly conjugating and fruiting in September, when it is floating in dirty, yellowish, frothy masses.

Zygnema peliosporium. Common on dripping rocks and on the margins of cold, shaded springs. Fruits abundantly in November. A beautiful species.

Glœotrichia pisum, Thur. Common in Sand Coulee Creek on the leaflets of *Myriophyllum spicatum*, L. Doubtless occurs throughout the State. August to October.

Tolypothrix distorta, Kg. Everywhere in flowing water, growing cæspitose on the rocks. Filaments of our specimens measure 12–20 μ diameter. July to October.

Tolypothrix pulchra, Kg. Common as the last; on dripping rocks and on wet wood-work of dams, flumes and the like, submerged twigs, etc., in springs and streams. July to October.

Nostoc muscorum, Ag. Abundant on moss under dripping rocks.

Nostoc calcicola, Ag. Plentiful on the rocks at the "Great Fall" of the Missouri, which are kept constantly wet by the drifting spray.

Nostoc commune, Vauch. Common throughout the State. On the high foot-hills (5,000 to 7,000 ft.), on the alkaline plains and in the valleys. Extremely variable; in innudated places, where the water is kept warm by the sun's rays, this nostoc grows with marvelous rapidity, and frequently attains a diameter of ten inches and half a inch in thickness.

Nostoc sphæricum, Vauch. This small species is particularly partial to damp rocks in shady ravines.

Nostoc verrucosum, Vauch. Common at the Falls of the Missouri and in spring water impregnated with lime. In the fall of the year this species is torn from its hold on submerged rocks in the upper Missouri River, rises to the surface and floats to the shore in large numbers. Sometimes watery, hollow specimens, the size of bantam eggs are picked up. This species seems to take the place of *N. pruniforme*, Ag., with us.

Nostoc flagelliforme, Berk. & Curt. Very common on the alkali plains about Helena and thence southward and westward. As one walks carelessly along, this curious *Nostoc* looks like small weather-beaten, entangled tufts of black horse hair. Hitherto only reported from Texas. See Wood's "Contributions," p. 226, and Wolle's "Fresh-Water Algæ," p. 285. This species is so very distinct from all other known species that it could never be mistaken for any of them. It is frequently in company with the plains form of *N. commune*.

Sphærozyga polysperma. Common in open, muddy pools heated by the sun's glare; rising to the surface in small frothy, scummy masses. Ponds and semi-stagnant mud-bottomed parts of streams in the mountains and on the plains. June to November.

Cylindrospermum macrospermum, Kg. Common throughout; same general habit and duration as the last.

Leptothrix calcicola, Kg. Stratum dull æruginous, or dull ferruginous. Common everywhere on damp or dripping rocks. All the year.

Leptothrix æruginea (Kg.), Kirch. Doubtless common; but collected but once covering the sides of a large glass jar filled with spring water and left standing in the window for several weeks. The filaments formed a dense film. The side applied to the glass was somewhat variable, being bluish, faintly purplish or glaucous green; the other side was a very rich green. August, 1886.

In the waters of Montana diatoms are very numerous; not so much perhaps in number of species as in the vast and very palpable aggregate of individuals. They often cover such plants as *Cladophora* so completely as to obscure the character of their hosts, while even in mountain torrents, the boulders and lesser stones are covered with them so as to render the fording of a stream a slippery and, at times, even a dangerous task. Prof. C. Henry Kain has kindly examined our scanty collection in this branch. The following species are common and interesting:

Synedra ulna (Nitzsch.), Ehr. On or with *Spirogyra* and *Zygnema*, sp.; very common.

Cymbella gastroides, Kutz. Very common in cold, rapid streams, forming hemispherical, slippery, gristle-colored masses, with myriads of minute diamonds flashing on all sides when the sun shines clearly.

Fragilaria capucina, Desmaz., is also very commonly mixed with foregoing species. The entire list reported by Prof. Kain is as follows:

Synedra ulna (Nitzsch.), Ehr.

Synedra (*ulna*, var.) *Danica*, Kutz.

Meridion constrictum, Ralfs.; some specimens are quite near to *M. circulare.*

Diatoma hiemale (Lyng.), Heiberg, var. *mesodon*, Grun.

Melosira varians, Agardh.

Cymbella gastroides, Kutzing.

Cymbella cymbiformis, Ehr.

Cymbella cistula, Hempr.
Cymbella lanceolata, Ehr.
Encyonema ventricosum, Kutzing.
Eunotia lunaris (Ehr.), Grun., var. *excisa*, Grun.
Surirella angusta, Kutz.
Gomphonema acuminatum, Ehr.
Gomphonema Herculaneum, Ehr.
Gomphonema ventricosum, Greg.
Rhoicosphenia Van Heurckii, Grun.
Cocconeis pediculus, Ehr.
Cocconeis placentula, Ehr.
Epithemia turgida (Ehr.), Kutz.
Navicula varians, Greg.
Fragilaria capucina, Desmaz.

In concluding this article it were not well to forget the constant courtesy and practical assistance rendered us from time to time since 1885 by our venerable friend, the Rev. Francis Wolle, and by Dr. Wm. Albert Setchell, who have each done much towards determining our humble collections of Montana algæ, and towards encouraging our work in a region where all discouragement possible, until very recently, has been perpetually cast in our way.

Myriophyllum Farwellii, nov. sp.

By Thomas Morong.

A few months since Mr. O. A. Farwell, of Ypsilanti, Mich., sent to the Herbarium a specimen of *Myriophyllum*, collected in a small pond in Keweenaw County, Mich., which without much examination was referred to the form named by T. and G. *M. ambiguum*, var. *capillaceum*. A subsequent study of the specimen convinced me that in some particulars it was distinct from anything hitherto published, and a more complete suite of plants sent recently by Mr. F. has confirmed my impression. It more nearly resembles *M. pinnatum* (Walt.), (*M. scabratum*, Mx.) in the flowers and fruit than any other North American species, but it is sufficiently different both in habit and botanical characters to merit specific rank. The stems are all submerged, and the flowers produced in their axils under water. Mr. F. writes that although quite abundant and frequently much longer than the depth of water in which they grow, the stems always curve over before reaching the surface and never protrude their tops into the air, a very unique habit so far as my experience with these aquatics goes. The outline of the stem and leaves is comparatively narrow, being about 2 cm. in breadth. Leaves scattered along the stem or in verticils or subverticils of 3s and 6s, pinnately parted, the divisions very finely capillary and in five to seven opposite or subopposite pairs, in the axils of which minute black spines often occur. Judging from the specimens furnished, it is dioecious, as I can find only pistillate flowers. Petals four, oblong, delicate, purplish in color, including four abortive stamens, which have silk-like filaments and minute, undeveloped anthers. Styles small, erect, plumosely stigmatic at the apex. The fruit is decidedly unlike that of *M. pinnatum* except in being scabrate. It is much larger than that, being, indeed, the largest of all the known species, varying in size from 2 mm. to 2½ mm. in length by about 1 mm. broad, while *M. pinnatum* has fruit not much over 1 mm. long by 1½ mm. in breadth. The carpels of the latter when fully developed are broadly two-winged on the back, the wings close together and strongly scabrate or sharply toothed, deeply grooved and smooth or slightly tuberculate between the wings, while those of the other have three, sometimes four rough tuberculate or slightly toothed ridges, and a comparatively shallow groove between them. When the ripe carpels separate, it will be seen that one or two of these ridges cross the back and one along each margin. Some of the fruits are on short stipes, a peculiarity which I have never noticed in *M. pinnatum.*

A new Liatris from North Carolina.

LIATRIS HELLERI.—Glabrous, with faint traces of pubescence on the pedicels and along the bases of the leaves; stem from a rootstock irregular in shape, leafy, fifteen or sixteen inches high; leaves linear, acuminate, diminishing in size and breadth upward, the lowest three lines wide in the middle, not punctate; raceme three to four inches long, loose, inclined to droop; heads six lines high, on short, slender, ascending pedicels, seven to ten-flowered; bracts of the involucre lax, not appressed, light green, with narrow scarious rarely purplish margins, not glandular-punctate, oblong-linear, the tips obtuse, or often so doubled in as to appear acute, lowest short, ovate, acute or acutish; pappus plumose, scanty, weak, scarce half the length of the corolla-tube; achenes as long as corolla-tube and sparsely hairy.

Collected on the top of Blowing Rock Mountain, Watauga County, N. C., by Mr. A. A. Heller, August 18th, 1890, and found mixed with *L. graminifolia*, Willd , in his Nos. 81 and 82. The specimens of the latter were from lower elevations and are remarkable in having involucral bracts wholly destitute of glandular dots.

THOS. C. PORTER.

Central Michigan Cyperaceæ.

Last September, while collecting along the shores of Park Lake, six miles northeast of the college, my attention was attracted by an unknown *Eleocharis* growing in the shallow water. I had previously collected here, *Eleocharis olivacea*, *E. quadrangulata*, *E. palustris* var. *vigens*, *Cyperus Engelmanni*, and *Scirpus Smithii*; and now to be able to add another, and that an unknown *Eleocharis*, to my already overflowing vasculum, was good fortune indeed. Specimens afterwards sent to Dr. Sereno Watson, proved that *Eleocharis Robbinsii* was no longer confined in "shallow water, New England to Florida."

This species and *E. olivacea* are new to the flora of Michigan. On the shores of Pine Lake, two miles southeast of Park Lake, are found *Fimbristylis autumnalis*, *Scirpus Torreyi*, *Hemicarpha subsquarrosa.*

Carex umbellata was found in good fruit, May 5th, 1890, on bluffs along Grand River, ten miles west of the college. At the same time and place was collected *Carex communis*, var. *Wheeleri*. In former years, near Hubbardston, I had collected about a "Deer Lick" *Eleocharis pygmæa*, *E. rostellata*, and *Scirpus Olneyi*, and on bluffs near by the rarest of all Michigan Cyperaceæ—*Scirpus Clintonii*. In the same vicinity are found *Carex Richardsonii*, *C Careyana*, *C. sychnocephala*, *C. platyphylla*, *C. triceps*, var. *hirsuta*, *C. aquatilis*, *C. retrorsa*, var. *Hartii*, *C. squarrosa*, and many other species. *Carex tenuiflora*, *C. pauciflora* and *C. Magellanica*, are found in a small sphagnous swamp near the college.

C. F. WHEELER.

Michigan Agricultural College.

Two Letters on Pinus Banksiana.

Dr. N. L. Britton:

Dear Sir.—I was observing a note of yours made in the Bulletin some years ago, in regard to the size of *Pinus Banksiana*. The largest trunk I ever saw grew in the southeastern part of Grand Traverse County, Michigan. I have a cut three feet long in our museum; the top end, including the bark, is just one foot and a half in diameter, measured in either of two directions. It is perfectly sound. Several others nearly as large have been seen in various parts of the state.

At the mouth of the Au Sable River entering Lake Huron, in poor, sandy land, these trees grow very slowly. Many of them have a clean trunk for three to eight feet and a spreading top considerably like that of a well-shaped apple tree. I am told that this shape is common in Northern Minnesota. Large areas of sandy land in Crawford and Osceola counties are mainly covered with Jack Pines. In many places the trees are "stocky," twenty to forty feet high, with limbs near the ground and a wide-spreading, conical top. The people in the vicinity speak of them as "Black Jack Pines" or "Buckwheat Pines." They are making a comparatively rapid growth. In places where the soil is apparently a little better these trees are thicker and taller, with straight, slender, nearly cylindrical trunks forty to sixty or seventy feet high, and a diameter from eight inches to a foot or more. Such trees are called "Yellow Jack Pines," and as they have small bushy tops, make only a slow growth.

Many people believe that the pitch and leaves of *Pinus Banksiana* are poison to the ground, so that little else will grow near them. It is needless to say, there is no foundation for this notion.

Occasionally the trunks of good "Yellow" Jack, are used for cutting into lumber of an inferior quality, which is graded as "Norway" pine. The timber is also, to some extent, used for fence posts and stove wood.

I have seen this pine in the sand south of Lake Michigan in northwestern Indiana.

W. J. Beal.

Agric. College, Mich., June 11, 1890.

PROF. J. S. NEWBERRY:

DEAR DOCTOR.—Miss E. Torrey brought me over yesterday some back numbers of the BULLETIN to look at. In the one for November, 1889, I find two papers (by E. L. Rand and J. H. Redfield) on the most southern station yet found for *Pinus Banksiana*. Turning to BULLETIN, August, 1882, I read: "Appalachia for June contains a few notes on the flora of the White Mountain region, and the statement is made that *Pinus Banksiana* has been detected on Welch Mountain (lat. 43° 55′ N. long. 71° 35′ W.)"

In Appalachia, June, 1882, J. H. Huntington writes (page 65): "There was also found on Welch Mountain the gray scrubpine, *Pinus Banksiana*. This is thought to be farther south than any point where it has been previously seen."

The facts in the case are as follows: August 9, 1881, my sister, Miss Edith W. Cook, being on Welch Mountain, Thornton, Grafton Co., N. H., found sundry stunted specimens of *Pinus Banksiana* on the mountain top (2,500 or 2,600 ft. high). She brought to me some branches and some of the lop-sided cones. I sent specimens of the same to Prof. Huntington, who was Councillor of Natural History to the Appalachian Club for that year. He issued the notice given in the "Appalachia" of the following June (1882), whence it was copied into the BULLETIN for August, 1882.

I know that botanists receive with difficulty the testimony of any eyes but their own; hence I sent specimen and cone to Prof. Huntington, who thus made the statement on his own positive knowledge. My sister and myself have never seen the tree elsewhere.

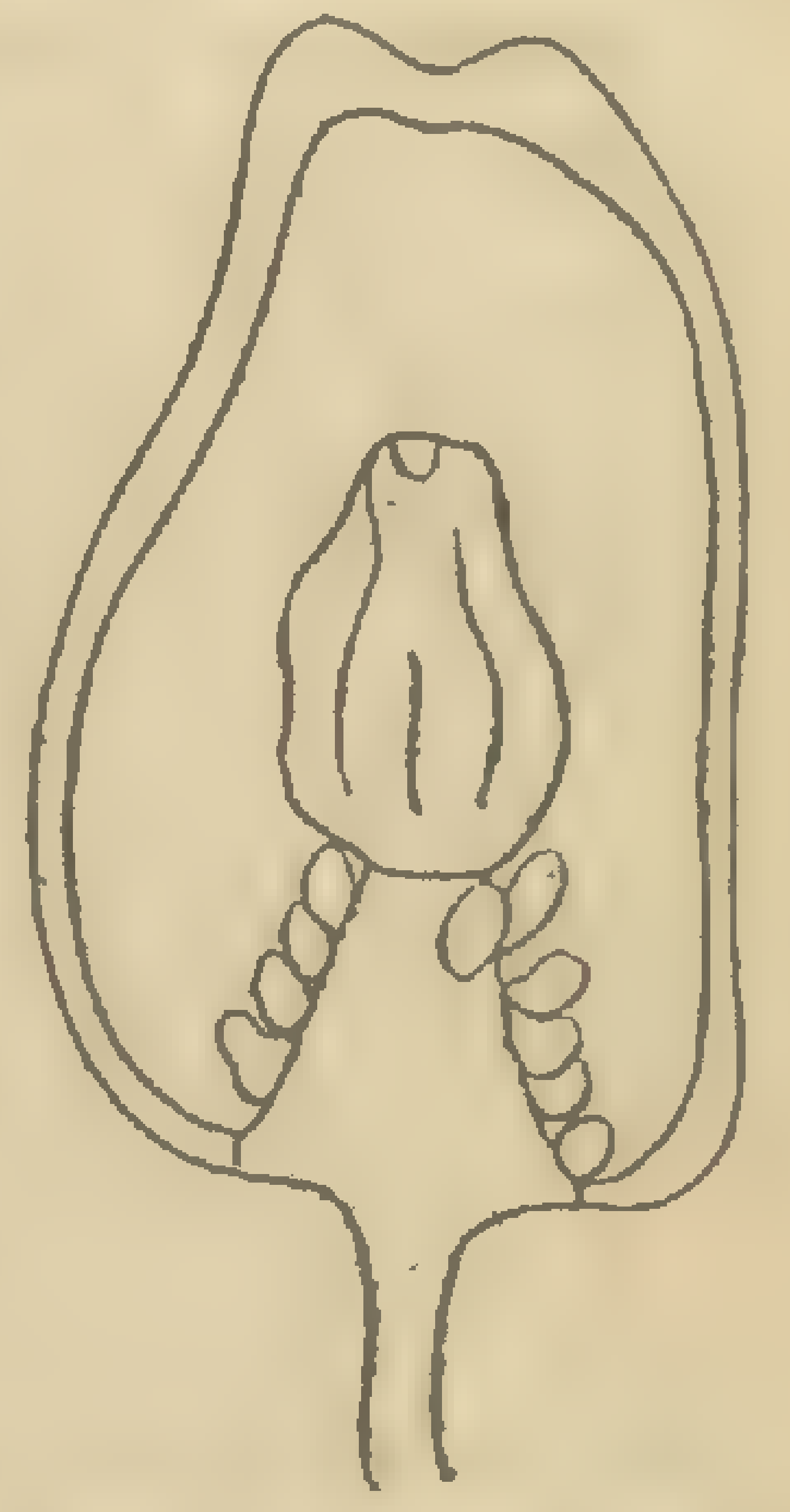
I enclose a little branch-end, and only wish I had one of the characteristic cones to send. But I have only one left, and must keep that as a proof for the sceptical.

Very truly yours,

LUCIA G. PYCHOWSKA.

HOBOKEN, N. J., April 27, 1890.

Botanical Notes.



A Strange Thing in Peppers. While examining some peppers for a new anthracnose, a peculiar structure was found within one of the fruits. In the ordinary mature pepper there is a fleshy columella rising from the base half way to the apex, upon which the seeds are borne. In the fruit in question this columella or compound placentæ was crowned by a small fruit not at all unlike a normal pod and was green. The accompanying outline engraving shows the position of the internal parts of the pepper with the young fruit in position. While it is interesting to go off into abstruse philosophy and endeavor to account for this strange method of secondary fruiting, the writer will restrain himself and leave the fact for those who may be inclined to speculate with. BYRON D. HALSTED.

Hybrid Plants.—Why should we assume that because a form of *Solidago serotina* is sterile, that it may, *therefore*, be a hybrid? Is the sterile form of *Cnicus arvensis* a hybrid? Possibly I have had as much experience by actual experiments in hybridizing as any one, but I never found hybrids any more sterile than other plants. On the other hand I have known of numerous cases of sterility, that are certainly not hybrids, so numerous as to considerably outweigh the latter. THOS. MEEHAN.

Melia Azederach.—We used to get seed from Alabama and Mississippi. The plants were easily killed by light winters. Seeds from Virginia give plants that prove hardy in Germantown, near Philadelphia. This is also true of *Magnolia grandiflora.* The facts are interesting as showing that the common belief in acclimation is not wholly a myth. THOS. MEEHAN.

The Pubescence of the Achenes of Solidago. I have examined a considerable number of specimens of *Solidago* with pubesent achenes. And in every case, so far, I have found the hairs of this pubesence *twin*, that is, there are always two cylindrical cells grown together longitudinally, and separate, if at all, only near the apex. JOHN M. HOLZINGER.

A Question for Teachers. How far shall we yield to the incursions of the new Latin and Greek pronunciations? For a long time I have held conservative ground as regards botanical names, but now I am forced by circumstances to partly adopt the heterodox modern notions. When my students speak of "Rahnoonkulahkeei" and "Istivation" (I spell the words phonetically) I now, with some mental effort, recognize a family of plants and a condition of the bud. Not without a shudder, however, do I respond in kind, still, I am convinced we must come to it, and we had better yield gracefully; at least there should be uniformity between teacher and pupil.

Brown University, Mar. 17, 1891. W. W. BAILEY.

Still Further Notes on the Flora of the Rangeley Lakes, Maine. I have read with much interest the articles in the BULLETIN of Oct. '89, and Feb. '90, by Mr. L. N. Johnson and E. L. Rand, Esq., and feel impelled to send an additional list of plants which I collected there in the months of July and August, thereby contributing thirty-seven new ones to the published list:

Caulophyllum thalictroides; Brasenia peltata; Dentaria diphylla; Stellaria borealis; Rhamnus alnifolia; Acer Pennsylvanicum; Acer spicatum; Trifolium agrarium; Rosa nitida; Potentilla palustris; Cornus Canadensis; Galium trifidum, var., *pusillum; Solidago macrophylla; Inula Helenium; Tanacetum Huronense; Vaccinium Vitis-Ideæ; Moneses grandiflora; Pyrola minor; Mentha Canadensis; Scutellaria lateriflora; Scutellaria galericulata; Rumex sanguineus; Microstylis monophyllos; Corallorhiza innata; Listera cordata; Habenaria bracteata; Habenaria dilatata; Habenaria obtusata; Habenaria orbiculata; Habenaria fimbriata; Smilax rotundifolia; Trillium erectum; Juncus effusus; Botrychium simplex; Botrychium lanceolatum; Botrychium matricariæfolium; Ophioglossum vulgatum.* KATE FURBISH.

Notes from Long Island. The following plants have been found by me growing without cultivation, though some have undoubtedly recently escaped, and are not permanent.

In Cypress Hills Cemetery, *Muscari botryodies, Bellis perennis, Hieracium aurantiacum*, which I also found common in fields at Summit, Schoharie Co., N. Y., and a friend found it at Saratoga. At New Lots I have seen young trees of *Pawlonia* growing along fence rows; *Medicago sativa* in an uncultivated field, and *Trifolium hybridum* is common, as it is in Brooklyn and elsewhere on the western part of Long Island. At Fresh Pond is a patch of *Stellaria graminea*. At Maspeth *Chelidonium majus* is permanent. My wife found *Trifolium incarnatum* growing in an open field on Shelter Island. *Apium nodiflorum* was found at Forbell's Landing, probably not established.

Asclepias obtusifolia, *Tephrosia Virginiana* and *Euphorbia Ipecacuanhæ* are common in Woodhaven; *Kalmia latifolia*, *K. angustifolia* and *Calopogon tuberosus*, forma *albiflorus*, occur at Forbell's Landing, as also *Lysimachia thyrsiflora*, *Gerardia purpurea*, forma *albiflora*, *Sabbatia stellaria*, forma *albiflora*, *Aster concolor* and *Aster Nova-Angliæ*, forma *albiflora*. *Liparis liliifolia* and *Aralia hispida* occur in Cypress Hills Cemetery.

GEORGE D. HULST.

Eatonia Dudleyi, *Vasey*, *in Connecticut*. This grass was found by the writer, in May, 1890, near Shelden's Cove, in the town of Lyme. It grew in fair abundance upon wooded slopes, bordering the creek. This species has not hitherto, so far as I know, been reported from New England. I have to thank Dr. Watson and Prof. Eaton, for confirming the identity of specimens from this locality. CHARLES B. Graves, M. D.

NEW LONDON, CONN.

A Correction. In Mr. Fernald's list of Maine plants, April BULLETIN, *Hypericum Canadense*, var. *minimum*, should be omitted. [Eds.]

Reviews of Foreign Literature.

Protoplasmic Union between the Neighboring Elements of the Plant.—In the *Botanische Zeitung*, beginning January 2d, 1891, and ending January 30th, is a long article by F. Kienitz-Gerloff with the above title. It is much too long to give a fair idea of its contents in the space allotted the reviewer, but a summary of his results and conclusions is as follows: After explaining the methods of investigating, a long list of plants is given in which this continuity of protoplasmic threads was observed. The list begins with the Hepatics and ends with the Compositæ. He gives the two theories regarding the function of these threads, first, that they serve as conductors of dynamic stimulus, second, as a means for conducting the various food elements to the different parts of the plant.

According to the first, the sieve-tubes and their contents correspond to the nerves of the animal. He gives the opinions of Pfeffer, Haberlandt, and many others in favor of this theory, and quotes from Pfeffer that even the cell wall may contribute to this effect by the motion of its particles uniting with that of the protoplasma molecules. All these authors agree, in general, that this conduction of stimulus is one function of the continuous protoplasmic threads. There is, however, much less unanimity in regard to the second theory. Various objections are quoted; among others, the exceeding fineness of the perforations in the wall through which the threads pass. The author thinks this objection of little value, even if it were not possible to show in many cases that the perforations were of considerable size.

He says that if we discard this theory, which, in general, has reference to the passage of organic material, we must suppose this material finds its way through much finer channels, namely, between the molecular interstices of the wall, either by filtration or osmosis. Here is given the experiment of De Vries to show that by diffusion alone, even those substances conveyed the most rapidly, e. g., cane-sugar and salt, would find too slow transport to meet the needs of the plant. According to this experiment it would take a milligram of salt in a ten per cent. solution three hundred and nineteen days to move the distance of a meter in water. Albuminous substances would require fourteen years.

By comparing the results obtained by his own studies with those of many others, the author decides that an important function of these threads is the transport of organic matter to various parts of the plant. Furthermore, that they may serve as conductors of stimulus, as by their means the whole protoplasmic contents may be withdrawn from one part of the plant to another. This latter view, he says, may account for the entire lack of protoplasm in the ducts and schlerenchymatic cells whose walls are completed in thickness. As soon as this thickening process is completed the protoplasm is withdrawn to neighboring cells, where it may be of further service in the plant economy. The same hypothesis also explains the cause of the sudden disappearance of protoplasm in the autumn leaves of deciduous trees. The contents of the leaf cells, on the approach of cold or other disagreeable environment, suddenly wander back through the petioles into the stem, just as the plasmodium withdraws an arm when it comes in contact with anything disagreeable.

This view, he says, is sustained by the fact that among the large numbers of fallen leaves already withered and sere, which he examined, no trace of protoplasm was found except in the guard cells of the stomatæ. Here occurred both protoplasm and chlorophyll grains. In all his previous examinations of healthy leaves, no trace of protoplasmic union between these cells and those surrounding them was found. Therefore it would be impossible for them to lose their contents by the means suggested. In answer to the question, how they obtained their supply in the first place? he says they may have received protoplasm and chromatophores when first cut off from the neighboring epidermal cells, and that probably these contents were at first connected with those of the neighboring cells, and later the perforations were closed. According to this notion they must have been obliged to furnish all their own organic nourishment after this separation occurred. The reason for this isolation he finds in the supposition that were they subject to the otherwise universal exchange of organic material they would, at times, be deprived of turgor-producing substances, so fail in their office of opening and closing.

In conclusion, he states that in germinating seeds no union exists between the protoplasm of the embryo and that of the neighboring cells, neither is it found between the haustoria of parasitical plants and the cells of their hosts. This facts offers no objection to his view, as according to it, only the organic material, which is insoluble in water, is transferred by these protoplasmic threads. Wortmann has shown that the change of starch to a material soluble in water is accomplished by diastase only in the holders of reserve material, such as starch-holding seeds, etc. Accordingly solutions occurs here which may feed the plant by osmotical processes.

No union was found to exist between the cells of low plants where each cell is able to perform all the metabolic functions. An exception to this statement must perhaps be made of the *Volvox* and certain others of this family. The fungi were not examined.

E. L. G.

Recent Literature on the Diatomaceæ.

Diatomaceæ of North America. Rev. Francis Wolle.

There has long been an urgent demand for a work upon diatoms at a reasonable cost. Dr. Wolle has met this want admirably in the present work. Students of the Diatomaceæ will also appreciate the work which the author has done in bringing together a large number of illustrations that have heretofore been almost inaccessible, for it is well known that the literature bearing upon the subject is scattered and costly. A valuable feature is the reprinting from "The Lens," of Prof. H. L. Smith's "Conspectus of the Families and Genera of the Diatomaceæ." It would have been well, however, if Dr. Wolle had refrained from specifying certain genera in the Conspectus, as not North American. Several of the genera thus indicated are undoubtedly North American.

The plates, 112 in number, are well executed. It is to be regretted that a rather large list of errata in the text has been rendered necessary, owing to the author's serious illness, while the work was in course of publication.

Atlas der Diatomaceen-kunde. A. Schmidt.

Fascicles 39 and 40 have just been issued, thus bringing the work up to Plate 160. Sendai, Oamaree, and Atlantic City, each contribute a number of new species. The continued disability of the veteran diatomist, Herr Grunow, has prevented his assistance in preparing the present number.

On the Structure of the Pleurosigma Valve. T. F. Smith, F. R. M. S.

Diatom Structure—The Interpretation of Microscopical Images. Jacob D. Cox, LL.D., F.R.M.S. (Journal of New York Microscopical Society, Vol. vii. No. 2. April, 1891).

Recent improvements in microscopical objectives have rendered possible far more accurate information in regard to the character of diatom structure than was formerly possessed. The two papers mentioned are valuable contributions to the literature of the subject. Mr. Smith's paper is accompanied by two plates, containing twenty excellent phototype illustrations.

Le Diatomiste. J. Tempére, Paris.

The fourth number of this serial, just issued, is entirely devoted to a monograph upon the genus *Pleurosigma*, by M. H. Peragallo. The article embraces sixteen pages of text, and is accompanied by five plates, containing one hundred and nine figures. A synoptical table is given, which is so concise that it is likely to afford material aid in tracing species. C. H. K.

Index to Recent Literature relating to American Botany.

Abies religiosa. (Gard. Chron. ix. 304, figs. 69, 70).

A Botanical Excursion into Lycoming and Luzerne Counties, [*Pa.*] (College Student, xi. 108-110).

An interesting account of an autumn expedition by Messrs J. K. Small and A. A. Heller, students in Franklin and Marshall College. In the list of plants collected we note the discovery of *Aster concinnus*, Willd., as of special interest.

Apodanthes—Two Undescribed Species of. B. L. Robinson. (Bot. Gaz. xvi. 82-84, Pl. ix).

Descriptions and representations of *Apondanthes Pringlei*, Watson, on branches of *Dalea frutescens* and *A. globosa*, Watson, on *Bauhinia lunarioides*, both collected by Mr. C. G. Pringle, in the Sierra Madre, near Monterey.

Bessera elegans. (Gard. and For. iv. 124, f. 24).

Black Rust of Cotton ; a Preliminary Note. George F. Atkinson. (Bot. Gaz. xvi. 61-65).

A discussion of the parts played in the above disease by *Cercospora Gossypina*, *Colletotrichium Gossypii*, *Macrosporium nigricanticum*, [n. sp.], *Phyllosticta Gossypina* and *Alternaria* sp.?

Cuscuta Glomerata with its Host—The Union of. W. C. Stevens. (Trans. Kans. Acad. Sci. xii. 163, 164, illustrated).

Erythræa Pringleana Wittr. nov. spec. Veit Wittrock. (Bot. Gaz. xvi. 85). Based on C. G. Pringle's, No. 2595.

Mr. Pringle adds the following note : "It may be well enough to state in this connection that what was distributed as '*Microcala*

n. sp.,' (No. 2598), is *Schultesia Mexicana*, Watson, n. sp., soon to be published."

Evolution in Leaves. Mrs. W. A. Kellerman. (Trans. Kans. Acad. Sci. xii. 168-173, illustrated).

This is a statement of some facts observed in the lobing of leaves and development of stipules, followed by a discussion of the significance of the facts in relation to the forms of leaves. *Rubus villosus*, *Vitis quinquefolia*, *Rhus Toxicodendron*, *Sambucus Canadensis*, *Negundo aceroides*, *Symphoricarpus racemosus* and *Cimicifuga racemosa* are made use of as examples, and *Rubus*, *Rosa*, *Tecoma* and *Vitis*, are the subjects of illustration. There is also a list of plants designed to show that large leaved plants harbor fewer insects than finely divided ones, and that, therefore, the evolution from entire to dissected leaves was not due to an attempt of the plant to escape from the ravages of insects. The author is manifestly in sympathy with the views of Grant Allen, that leaves become dissected in their efforts to obtain air and sunlight. A. H.

Flora Franciscana. Au attempt to Classify and Describe the Vascular Plants of Middle California. Edward L. Greene, (Part I, 8vo. pp. 128. San Francisco. Issued March 30, 1891).

A portion of the collected results of Prof. Greene's critical studies of the Flora of this part of Western America, extending over many years, is now, happily, given to the world. It is the first time that he has essayed to present a descriptive synopsis of the flora of a region, or anything in the nature of monographs of genera, all his available time for writing, up to the present, having been needed for the separation and characterization of new or obscure species, the discussion of questions of nomenclature, and other work of a non-consecutive character on the plants of what has been, botanically, a little known area. American botanists have awaited the production of the work now noticed, with impatience, for it has been felt that he, and he only, could satisfactorily bring together the multitude of facts and observations which he has recorded in the publications of the California Academy of Science, Pittonia and the BULLETIN. Departing entirely from the long-followed sequence of natural orders established by the elder DeCandolle, the Leguminosæ are placed first, the orders included in this part being arranged in the following sequence: Leguminosæ, Drupaceæ, Pomaceæ, Rosaceæ, Calycantheæ, Juglandeæ, Rutaceæ, Sapindaceæ, Anacardiaceæ, Celastrineæ, Rhamneæ, Tithymaloideæ, (the name antedating the equivalent Euphorbiaceæ), Polygaleæ, Lineæ, Geraniaceæ, Malvaceæ, Hypericeæ, Elatineæ, Frankeniaceæ, Caryophylleæ. It will be seen that the orders of the artificial division Apetalæ or Incompletæ, are inserted among the polypetalous, or better choripetalous orders, where their affinities naturally place them, and this is a great advantage in arrangement. Prof. Greene follows Bartling's ideas in the main, believing the Leguminosæ to be the most complex plants.

The following new species are described and new binomials proposed: *Vicia linearis* (*Lathyrus linearis*, Nutt; *V. Americana*, var. *linearis*, S. Wats. *V. sparsifolia*, Nutt. appears to be a prior name for the same plant); *Vicia Californica; Amorpha hispidula; Trifolium amœnum; Trifolium roscidum; Lupinus longipes; Lupinus nemoralis; Amygdalus fasciculata* (Torr); *Cerasus Californica* (*Prunus emarginata*, Brew. and Wats.), *Amelanchier glabra; Amelanchier pallida; Basilima Millifolium* (Torr); *Schizonotus ariæfolius* (Smith); *Potentilla biennis; Rosa Sonomensis; Rosa gratissima; Ceanothus rugosus; Euphorbia rugulosa* (Engelm); *Erodium Californicum; Flœrkea rosea* (Hartw.); *Flœrkea alba* (Hartw.); *Sidalcea secundiflora; Malvastrum Parryi; Malvastrum fasciculatum* (Nutt.); *Malvastrum orbiculatum; Malvastrum multiflorum; Tissa Clevelandi*, and four under *Alsinella*, the only pre-Linnæan generic name taken up to replace one used by Linnæus. We wish Professor Greene had accepted *Sagina*.

As to nomenclature, original specific names are of course rigidly maintained. The parenthetic citation of authors is, however, not favored, although used to some extent. Generic names used by pre-Linnæan authors and adopted by Linnæus are accredited to the old writers even as far back as Dioscorides and Pliny. This practice has appeared to us to be straining a point for history's sake and is open to criticism on the ground that the ancients did not use the names in the generic sense of Tournefort, Linnæas and others of about their time, but in most cases, at least, as mere appelations for plants. It would seem on the whole best to adopt the plan of Bentham and Hooker, not to go back of Linnæus. If it is thought desirable to refer to the ancient history of the science, that can best be treated by itself, and Professor Greene's great learning in that topic would provide him material for a most valuable and interesting volume.

How can he, in any event, safely credit a name to Dioscorides or Theophrastus? They, surely, did not originate such terms as *Astragalus* and *Sorbus*, but merely recorded what certain plants were called in their time. Some of these terms must be as old as spoken language, and probably a number of them exist on the monuments of ancient Egypt. N. L. B.

Flora of Kansas—Additions to the. B. B. Smyth. (Trans. Kans. Acad. Sci. xii. 105–119).

This is stated to be in the nature of a supplement to the catalogue of Kansas plants prepared by Prof. J. H. Carruth about fourteen years ago. The title of the paper should include the term "Subtractions from" as well as "Addition to" the flora, as the author begins with the excellent plan of eliminating 160 species which have been credited to the State but need confirmation, leaving 1,355 species, to which are to be added the 355 Anthophyta and 16 Pteridophyta included in this paper. A preliminary list of 96 mosses is also added, so that the totals for the known flora of the State now stand: Anthophyta 1,666, Pteridophyta 40, Musci 96. The nomenclature used is not up to modern standards, and we are inclined to deprecate such fine distinctions as are included under the terms "escaped," "escaping," "escaped slightly," "escaping slightly," "escaping sparingly" and "trying to escape," but localities are freely noted and the work will undoubtedly be of value to every botanical collector in Kansas. A. H.

Flowers and Insects, VI. Chas. Robertson. (Bot. Gaz. xvi. 65–71).

The flowers which are the subjects of this contribution are those of *Triosteum perfoliatum*, *Cephalanthus occidentalis*, *Lobelia spicata*, *L. leptostachys*, *L. syphilitica*, *L. cardinalis*, *L. cardinalis* ×*syphilitica*, (in which the corolla is described as "shorter and broader and the lobes shorter and firmer than in *L. cardinalis* and

. . . of a deep reddish or crimson-purple."), *Campanula Americana* and *Apocynum cannabinum.*

Fossil Wood from the Erian (Devonian) of New York and Kentucky—Note on Specimens of. Wm. Dawson and D. P. Penhallow. (Can. Rec. Sci. iv. 242–248, pl. I).

The claim is made that one of the specimens examined represents the genus *Kalymma* of Unger, not previously recognized in America. The specimens in question were found in the Genessee shales of Moreland, Ky., and were subjected to microscopic examination. *Kalymma grandis* is figured—showing transverse section of stem, natural size and enlarged sections of vascular bundles, with wood cells, parenchyma, sclerenchyma cells, etc. The other species determined are *Dadoxylon* (*Cordaioxylon*) *Clarkii*, and *D. Newberryi.* The authors incidentally discuss the relationship between the genera *Cordaites*, *Cordaioxylon*, *Dadoxylon*, *Araucarites*, *Aporoxylon* and *Palæoxylon.* A. H.

Fungi—Two New Species of Montana. J. B. Ellis and F. W. Anderson. (Bot. Gaz. xvi. 85, 86, pl. X).

Explanation and plate belonging to the description of *Spirodesmium sorisporioides* and *Aecidium Liatridis* published on p. 47 of the Gazette for Feb. 1891.

Fungous Diseases of the Grape and other Plants and their Treatment. F. Lamson-Scribner. (8vo, pp. 134, Little Silver, N. J. 1890, illustrated).

Professor Scribner has brought together accounts of several fungous diseases of grapes in this little book, written in a clear and popular style. It includes a general description of Fungi and detailed information about the Black-rot of Grapes (*Læstadia Bidwellii*); the Bitter-rot (*Greeneria fuliginea*); the Brown-rot (*Peronospora viticola*); the Powdery Mildew of the Vine (*Uncinula Ampelopsidis*); the Grape-leaf Blight (*Cladosporium viticolum*); the Root-rot (*Agaricus melleus* and *Dermatophora necatrix*); Bird's-eye Rot (*Sphaceloma Ampelinum*) and Anthracnose. Besides these grape pests there are described the Black-rot of the Apple (*Macrophoma malorum*); Apple-rust and Cedar Apples (*Gymnosporangium macropus*); Apple-scab (*Fusicladium dendriticum*); Pear-scab, caused by the same fungus; the cracking of the pear (*Entomosporium maculatum*); Plum-rot (*Monilia fructigena*); Black-Knot of the Plum and Cherry; Leaf-spot Disease of the Plum and Cherry (*Septoria Cerasina*); Powdery Mildew of the Cherry (*Podosphæra Oxyacanthæ*); Peach-leaf Curl (*Taphrina deformans*) and several others.

The work will prove an important one for fruit growers, and can be had for seventy-five cents, bound in cloth, from the J. T. Lovett Co., at the place of publication. It is well illustrated and embellished by a portrait of the handsome and distinguished author.
N. L. B.

Garrya elliptica. (Garden, xxxix. 261; illustrated).

Hackberry Branch Knot—Note on the Distribution and Ravages of the. W. A. Kellerman. (Trans. Kans. Acad. Sci. xii. 101–104, illustrated.)

A description of the affliction to which *Celtis occidentalis* is so generally subject, from the attacks of a gall mite (*Phytopus*) with the assistance of the fungus *Sphærotheca phytoptophila.*

Hydrastis Canadensis—A Contribution to the Life History of. Homer Bowers. (Bot. Gaz. xvi. 73-82, pl. viii.)

List of Plants found in Cherokee County, Texas—A Partial. Mrs. A. L. Slosson. (Trans. Kans. Acad. Sci. xii. 62, 63).

A list of about 170 species, chiefly remarkable for the large number of typographical errors contained in it.

Lygodium palmatum. (Garden, xxxix. 265, illustrated).

Masdevallia macrura. (Bot. Mag. t. 7164).

Notes on North American Trees—XXV. C. S. Sargent. (Garden and Forest, iv. 147-148).

Professor Sargent concludes that the eastern Sugar Maple should bear the name *Acer barbatum*, Michx. (1803), regarding the *A. saccharum*, of Marshall (1785), as not safely referable to the tree, while the Linnæan name *A. saccharinum* (1753), belongs to the Silver Maple. It appears to us that Marshall's name can safely be attributed to the Sugar Maple, first, because it is the principal sugar-producing species, and thus the one to which the designation *saccharum* would naturally be applied by one entirely familiar with the native maples, which Linnæus evidently was not; second, because Marshall notes that "it flowers in the manner of the Red Maple," indicating the production of flowers from lateral buds, as contrasted with the Striped Maple and Mountain Maple, which produce terminal racemes ; third, because he describes the flowers as of an " herbaceous " color, and they certainly are yellowish-green ; and fourth, because it is the only one of the six species described by Marshall which can apply to the Sugar Maple, with which we think it entirely safe to assume that Marshall was well acquainted. Professor Sargent expresses his conviction that *Acer grandidentatum*, Nutt. of the Rocky Mountain region, is not specifically distinct, and that the same is true of *A. nigrum*, Michx., a position in which we do not believe he will be generally supported. He follows recent European authors in reuniting *Negundo* with *Acer*, for which there appears to be abundant reason, and refers *N. Californicum* to *A. Negundo* as a variety, which does not seem to us to be as defensible.

N. L. B.

Peronosporaceæ—First Addition to the List of Kansas. W. T. Swingle. (Trans. Kans. Acad. Sci. xii. 129-134).

Species are enumerated under the genera *Cystopus*, *Plasmopora*, *Bremia* and *Peronospora*. The host-plants are given under each species. Eleven different kinds of type are used in this article, partly in order to emphasize new facts, and the result is a somewhat startling arrangement which, however, might not attract so much attention but for its novelty. We candidly confess that to us the appearance is rather confusing than otherwise.

A. H.

Periodicity in Plants. B. B. Smyth. (Trans. Kans. Acad. Sci. xii. 75-81).

The author begins by treating the subject of annual periodicity in development, and gives examples of individual eccentricities in trees, as to date of opening the leaves, blossoming, fruiting, etc. The daily motions of plants next receive the author's attention, and from them is constructed " A Floral Clock for Kansas " which begins with " 2 to 3 A.M. . . . . . *Convolvulus sepium ;* closes next evening " and terminates with " 11 P.M. . . . . *Cereus speciosissimus ;* wilts at 2 A.M." In addition to the facts embodied in the " Clock " there are several philosophical speculations scattered through the article, such as :

"Plants can feel, of course; but do they actually see? * * * We are not aware that we are cognizant of light by any organ except our eyes, and we call that seeing. The plant is cognizant of light in its leaves, in all their modifications. Is it not, at least, analagous to seeing? Is it heresy to say that, so far as light is concerned, plants can see?" The paper concludes with a discussion of twining and climbing plants, heliotropism, etc., and we are also told, in regard to the leaves of certain species of *Euphorbia* that "as soon as the dew begins to fall they fold together in pairs, as a child folds its hands to pray, * * * and remain thus all night." So far as the "clock" is concerned the facts embodied in it are of undoubted interest and value. A. H.

Pinus insignis. (Gard. Chron. ix. 337, f. 77 and plate).

Report of the Botanist of the California State Board of Forestry. J. G. Lemmon. Third Biennial Rep. Cal. State Board Forestry, 73-212, Sacremento, 1890).

This important paper by Prof. Lemmon is taken up mainly with an extended description of the Californian Coniferæ. It is prefaced by chapters on the general features of the group on "development the basis of classification," on "creative energy and development," and schemes of classification. The main part contains generic and specific descriptions of all the native and introduced species known to occur in California (except the pines, which were treated in a previous report), most of them illustrated by photographs taken by the author. The descriptions are drawn in a popular way, and accompanied by many interesting and valuable notes gleaned from Mr. Lemmon's long experience in investigating the western flora. The nomenclature adopted by Prof. Sargent is upheld, original specific names being maintained. Several new varieties are described.

Persons desiring the report may obtain it by enclosing 10 cents to Prof. Lemmon at 1015 Clay St., Oakland, Cal., as also copies of his preceding report on "Pines of the Pacific Slope" for the same sum. N. L. B.

Silver Maple—The. (Gard. and For. iv. 134, 135 f. 26.)

Popular description and representation of *Acer saccharinum*, or, as it is more generally known, *A. dasycarpum.*

Sorghum Smuts—Notes on. W. A. Kellerman and W. T.

Swingle. (Trans. Kans. Acad. Sci. xii. 158, 159, illustrated).

Descriptions of *Ustilago Sorghi and U. Reiliana*, the latter figured.

Vorläufige Mittheilungen über die von mir im Jahre 1888 *in Nord Amerika gesammelten neuen Arten und Varietäten der Laubmoose*, von Dr. Julius Röll. (Sep. Abd. Bot. Cent. no. 51, 1890, pp. 13).

The plants collected by Dr. Julius Röll have been named by various specialists. This installment includes twenty-three new species and twenty new varieties and sub-species of mosses named by Renauld and Cardot, Venturi, Müller, Brotherus and C. R. Barnes, the genera being *Dicranum*, *Barbula*, *Timmiella*, *Grimmia*, *Guembelia*, *Scouleria*, *Ulota*, *Orthotrichum*, *Pohlia*, *Bryum*, *Mnium*, *Myrinia*, *Pseudoleskea*, *Fontinalis*, *Neckera*, *Camptothecium*, *Brachythecium*, *Raphidostegium*, *Amblystegium*, and *Hypnum*. Suspecting *Mnium Röllii*, Vent. to be the same as *Bryum lucidum* (BULLETIN, Dec. 1889), I sent specimens of the latter to Dr. Brotherus and he confirms my suspicion. *Orthotrichum stenocarpum*, Vent. is also antedated by *O. lonchothecium*, CM. and K., Macoun's Canadian Mosses, No. 497, which I believe to be the same as Austin's *O. Macouni*, BULLETIN vi. 343, 1879. It is also worthy of note that *O. strictum*, Vent. subspec. nov. of *O. Lyellii*, is evidently only *O. Pacificum*, Hpe. which is a rigid, dark form of that species. E. G. B.

Winter Aspect of Trees. J. Walton. (Vick's Mag. xiv. 120-124; illustrated).

Fagus ferruginea, *Acer saccharum*, *Populus Canadensis* and *Robinia pseudacacia* are the subjects specifically treated. The representations of the trees are worse than poor, they are misleading and it is a pity that an article which could be made of interest and value should be spoiled by such illustrations. The previous contribution was open to the same criticism and we would suggest that hereafter the camera is the only safe instrument to use in case illustrations are desired. The author concludes with a description of how to calculate the height of trees.

Yuccas of California—The Arborescent. S. B. Parish. (Gard. and For. iv. 135, 136.)

On account of *Yucca brevifolia*, *Y. baccata* and *Y. briarfolia*.

Proceedings of the Club.

WEDNESDAY EVENING, MARCH 25TH.

The Vice President in the Chair and twenty-three persons present.

The paper announced "On some new Species of *Nitella*," was presented by Dr. Allen. Two new species, *N. Blankinshipii* and *N. stricta*, were exhibited and described, and their relation to known species commented upon.

Dr. Allen also remarked at length on the desirability of establishing a uniform method of botanical pronunciation, alluding especially to the three methods of Latin pronunciation in use at the present time. The subject was further discussed by Dr. Morong and Dr. Britton.

Dr. Morong spoke concerning the life and work of Rafinesque, remarking on his genius and acute powers of discrimination, stating that he agreed with Professor Greene that many more of the genera and species described by him must be recognized. He made especial mention of the recent publication of Rafinesque's will, by Mr. Thos. Meehan, in the columns of the *Philadelphia Ledger.*

Dr. Britton showed a specimen of *Eleocharis atropurpurea*, found by Dr. Wibbe in Fillmore Co., Nebraska, greatly extending its range to the north.

TUESDAY EVENING, APRIL 13TH.

The President in the Chair and twenty-eight persons present.

The desirability of uniform botanical pronunciation, brought up by Dr. Allen at the previous meeting, was commented upon by Judge Brown.

Dr. Morong presented the announced paper of the evening, "A Trip on the Pilcomayo River," giving an account of his experiences during a six months' journey in northwestern Paraguay and describing the floral features of the region.

Dr. Allen showed flowering specimens of *Pyxidanthera barbulata* received from Miss Farrington from Lakewood, N. J., and a number of vernal plants sent by Miss Gordon of Aiken, S. C., among them *Iris verna*, *Phlox amœna*, *Phlox subulata* and *Chrysogonum Virginianum*, the latter reported as the earliest flower of that region.

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I will have no class in Cryptogamic Botany in Cambridge this summer. It is my plan to collect both Cryptogams and Phaenogams during July to September in the Southern Alleghanies and on the Gulf Coast, making as full sets as possible and giving special attention to plants of economic interest, as Fungi, Grasses, etc. Some photographs of forest trees and other botanical objects may be made. I shall be pleased to correspond with persons interested.

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VOL. XVIII. JUNE, 1891. No. 6.

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EDITED BY
NATHANIEL LORD BRITTON,
AND OTHER MEMBERS OF THE CLUB.

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BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XVIII.] New York, June 1, 1891. [No. 6.

Notes on the Flora of High Altitudes in Custer County, Colorado.

By T. D. A. Cockerell.

During the last few years, while residing in Wet Mountain Valley, I have endeavored, as opportunity permitted, to ascertain something of the flora and fauna of the high altitudes in the Sangre de Cristo Range. The present notes are the results of these investigations, so far as regards the flora of this region. The species enumerated were collected on the eastern slope, in Custer County, and so far as I could guess at the altitudes, (having no aneroid), all are from 10,000 feet above sea level or upwards. These records, which all relate to the plants of the vicinity of Gibb's Peak, (miscalled Gibson Peak on the maps), will give a very fair idea of the general features of the flora, but it is to be remembered that the cryptogamia, grasses, carices, etc., were almost entirely neglected. There is a great opportunity for some future student of these groups in this district.

Most of the species from the Lakes of the Clouds, (11,000 feet or over), were collected by Mrs. M. E. Cusack, and many of the new forms enumerated are in her herbarium. I am greatly indebted to Dr. George Vasey, Dr. J. M. Coulter, Mr. F. W. Anderson, and Mr. J. B. Ellis, for the identification of some of the species.

Ranunculaceæ. About the Lakes of the Clouds are found *Ranunculus abortivus* and *R. pygmæus*, and *Trollius laxus*. In the timber one meets with an abundance of *Aquilegia cærulea*, a plant of great beauty and interest. Near the lakes, (whenever in this paper I refer to "the lakes," the Lakes of the Clouds are intended), occurs a f. *pallidiflora*, collected by Mrs. Cusack, with the flowers smaller, white tinged with blue, pods five, and larger leaves. In cultivation, a somewhat similiar variety has been produced, for Vilmorin's catalogue for 1889, p.114, enumerates a form, "à fleur blanche." It is noticeable that blue flowers most often vary to white.[*] Near the Micawber Mine there occurs a second variety of *A. cœrulea*, which I will call f. *glandulosa*.[†] It has six pods, and the peduncles and pods are pubescent and viscid-glandular. One head was found with as many as seven pods, but six is the usual number. The remaining Ranunculaceæ occur near the Micawber mine; *Actæa spicata* var. *arguta*, with red berries; and *Delphinium occidentale*, which has also a f. *subroseum*, with the sepals dull bluish-pink, and the plant not so tall.[‡]

BERBERIDACEÆ. *Berberis repens*, in the Micawber Mine Gulch, is the only representative of the order.

CRUCIFERÆ. *Cardamine cordifolia*, near the Micawber and in Swift Creek Gulch, and *Erysimum asperum*, in the Micawber Mine Gulch, are conspicuous. *E. asperum* presents two forms: of which f. *alpestre*, growing at about 10,000 feet, has the flowers becoming deep orange-brown.[‖] At timber line I found the other form —only 61 millimeters high, although the flowers are yellow and of the usual size. Near the Micawber Mine there occurs a puzzling *Sisymbrium*, which I will provisionally call *S. canescens* var. *alpestre*. It is tall, glabrous, stem with a white "bloom;" pods ascending, mostly longer than pedicels. *E. asperum* f. *alpestre* was found in flower at 10,000 feet, as late as Oct. 9th. *Achillea millefolium*, on Oct. 10th, was the last flower of the year at that high altitude.

---

[*] I have found this so in my experience, and Mr. F. W. Anderson, who is a close observer, writes me, (December 4th, 1889), as follows: "Yes, undoubtedly blue flowers more often vary to white than do those of any other color. Examples, various common Astragali, Lupins, Delphiniums: Gentians, like the yellows, are more apt to vary to green or greenish."

[†] There is already a species *A. glandulosa*, in Siberia, but this need not interfere with the use of that name for our present *form*.

[‡] *D. scopulorum*, which occurs abundantly at a lower altitude, I did not observe varying in this manner.

[‖] This variation occurs as the effect of altitude: lower down, the flowers of this species are yellow. A more extreme form, which I have not seen, has the flowers purple; Miss A. Eastwood found it in the Uncompaghre Cañon. Thus we arrive at the normal colors of some other Cruciferæ.

CAPPARIDACEÆ. This order has only a place in this list because seeds brought in hay to the Micawber Mine gave rise to a plant or two of *Cleome integrifolia*, a species normally occurring from 8,000 feet downwards.

VIOLACEÆ. *Viola Canadensis*, in the Micawber Mine Gulch.

CARYOPHYLLACEÆ. *Arenaria saxosa* near the lakes; and *Silene acaulis*, at timber line, above Brush Creek, the latter a form with pink flowers on peduncles about 15 millimeters long. *Saponaria Vaccaria*, growing near the Micawber, is merely the result of seeds from hay.

MALVACEÆ. *Sidalcea candida*, near the Micawber.

SAPINDACEÆ. *Acer glabrum*, common near the Micawber.

LEGUMINOSÆ. *Trifolium Parryi* and *T. dasyphyllum*, near the lakes—the latter also near Brush Creek. In the neighborhood of the Micawber we find *Thermopsis montana* and *Astragalus alpinus*, (a form with stipe shorter than calyx); and in Horseshoe Bend Gulch, at barely 10,000 feet, *Lupinus argenteus* occurs on a sunny slope.

ROSACEÆ. Near the lakes, *Potentilla dissecta*, *P. fruticosa*, *Rubus strigosus*, and *Fragaria vesca*—and the last three also near Brush Creek. Above the Micawber Mine occurs a f. *humilis* of *P. fruticosa*, a lower form with about twenty-five stamens: the more ordinary form has about thirty stamens; so this species varies in this matter like the *arguta* section. In the Micawber Mine Gulch are also found *Potentilla gracilis*, *Rosa blanda*, and *Geum macrophyllum*.

SAXIFRAGACEÆ. *Saxifraga nivalis*, *S. bronchialis*, *S. punctata*, and *Ribes lacustre* near the lakes, and the last three also near Brush Creek. *Parnassia fimbriata* occurs near the Micawber.

CRASSULACEÆ. *Sedum rhodanthum*, near the lakes; and above the Micawber *S. stenopetalum*, with a f. *rubrolineatum*, in which the angles of the closed buds are red; when the flower is open the peculiarity is less conspicuous. This is a very interesting variety, showing the tendency to vary to red—red being a normal color in others of the genus.

ONAGRACEÆ. *Epilobium spicatum* is of course abundant. At the Micawber is found *E. coloratum* f. *albiflorum*, with white flowers and glabrous pods. The *Œnotheras*, so conspicuous lower down, are completely absent.

UMBELLIFERÆ. Near the Micawber are *Heracleum lanatum*, *Ligusticum montanum* and *Osmorhiza nuda*. On bare ground at timber line I found a *Peucedanum*, apparently *bicolor*. I submitted it to Dr. Coulter, who remarked that so far as vegetative characters went it agreed with *bicolor*, but since it was gathered too early for fruit, its identity could not be made certain.

CAPRIFOLIACEÆ. *Lonicera involucrata*, *Symphoricarpos oreophilus*, and *Sambucus racemosa*, near the Micawber, and the last also in Swift Creek Gulch. The variation in the color of the fruit of *S. racemosa*, near the Micawber, is very striking. The ordinary form has bright scarlet fruit, but there are two varieties; f. *xanthocarpa*, with cyme rather broader, peduncles deep dark crimson, fruit pale yellow, leaves larger ; and f. *oinocarpa*, with fruit dull crimson. These varieties all grow together, and appear to differ in only the characters given here. According to Wood, *Sambucus* "*pubens*" has "berries rarely white." Although these elder-berries are so conspicuous, they do not seem to be eaten, not at any rate very largely, by birds.

RUBIACEÆ. *Galium boreale* is abundant near the Micawber Mine.

COMPOSITÆ. *Senecio aureus* var. *croceus*, *S. Fendleri*, *S. werneriæfolius*, *Aster foliaceus* var. *Parryi*, *Cnicus eriocephalus*, *Troximon glaucum*, *Aster Fremonti*, and *Achillea millefolium* occur near the lakes, and the last two near the Micawber Mine. *Cnicus eriocephalus*, a form with bright, chrome yellow corollas, is very conspicuous above the timber line, near Brush Creek. *Aster Fermonti*, near the Micawber, has two forms, *a. pallidus*, rays white, or nearly so, *b. vividus*, rays shorter, more numerous, lilac, with the outer involucral bracts dark, and shorter, radical leaves about 109 millemeters long. *Gymnolomia multiflora* occurs in Horseshoe Bend Gulch, and near the Micawber, and the following occur at various altitudes up to timber line in the Micawber Mine Gulch: *Artemisia scopulorum*, *A. franserioides*, *Antennaria dioica*, var. *rosea*, D. C. Eaton, (remarkable nodding forms at timber line), *Troximon aurantiacum*, *T. glaucum*, f. *alpestre*, (beak of akenes about 6 millemeters long, hardly as long as the pappus, the bracts with dark blotches outside, the leaves narrow, and entire). *Cnicus Parryi*, *Aplopappus Parryi*, *Erigeron glabellus*, var. *mollis*, and *Arnica cordifolia*. *Helianthus petiolaris*, near the Micawber, sprung from a dropped seed, and looked strangely out of place.

CAMPANULACEÆ. *Campanula rotundifolia*, Horseshoe Bend Gulch and Micawber Mine Gulch.

ERICACEÆ. *Moneses uniflora* and *Pyrola secunda*, near the lakes; and *Arctostaphylos Uva-ursi*, *Vaccinium myrtillus* and *Pyrola rotundifolia* var. *uliginosa*, near the Micawber. The *Vaccinium* replaces *Arctostaphylos* as we ascend.

PRIMULACEÆ. *Dodecatheon media* in the Micawber Mine Gulch, and var. *alpinum*, near the lakes. *Primula Parryi* is conspicuous in Swift Creek Gulch, and Horseshoe Bend Gulch.[*]

APOCYNACEÆ. *Apocynum androsæmifolium* near the Micawber.

GENTIANCEÆ. *Frasera speciosa* is abundant at timber line, near Brush Creek, and lower down one meets with *Gentiana heterosepala*, and near the Micawber *G. barbellata*, the latter being also found near the lakes. I found *Swertia perennis* in flower at the lakes in September, and Mrs. E. B. Cox showed me a specimen of *Gentiana frigida* also collected there.

POLEMONIACEÆ. *Polemonium humile* var. *pulchellum* and *P. confertum*,[†] near the lakes, the latter at timber line, above Brush Creek, where also occurs *Phlox cæspitosa*—a form with the corolla-tube much exceeding the calyx.

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[*] *P. angustifolia* occurs near the top of the range, not far from the lakes, but on the Saguache County side.

[†] It may here be worth while to record that Mr. W. C. Roby sent me a specimen of what is apparently without doubt *P. viscosum*, Nutt., collected at 12,000 feet on Holy Cross Mountain. This adds a new locality for this rare species.

HYDROPHYLLACEÆ. *Phacelia sericea*, near the lakes, and *Hydrophyllum occidentale* var. *Fendleri*, near the Micawber Mine.

BORRAGINACEÆ. *Mertensia Sibirica* and *Omphalodes nana* var. *arctioides*, both near the lakes and near Brush Creek—the last of course, at timber line, its brilliant blue flowers almost dazzling. *Mertensia lanceolata* occurs above timber line, near Brush Creek, and near the Micawber we get *Echinospermum floribundum.*

SCROPHULARIACEÆ. *Pedicularis Grœnlandica*, at the lakes; *Pentstemon glaucus* var. *stenosepalus*, both at the lakes and at timber line, above Brush Creek. *Mimulus luteus* and *Pedicularis procera* occur near the Micawber. The various forms of *Castilleia* have already been discussed in a previous paper. *Veronica alpina* and *Pentstemon cæspitosus* are found in the gulch above the Micawber.

OROBRANCHACEÆ. *Aphyllon fasciculatum*, at the Micawber.

LABIATÆ. Not one observed!

CHENOPODIACEÆ. *Chenopodium album*, introduced accidently at the Micawber, but useful as an excellent substitute for spinach.

POLYGONACEÆ. *Eriogonum flavum* and *Polygonum Bistorta*, above the timber line, near Brush Creek.

ELEAGNACEÆ. *Shepherdia Canadensis*, near the Micawber.

URTICACEÆ. *Urtica gracilis*, near Brush Creek.

CUPULIFERÆ. *Quercus undulata*, on sunny slopes near the Micawber and in Horseshoe Bend Gulch.

SALICACEÆ. *Salix monticola*, near the Micawber, and plenty of *Populus tremuloides.* Higher up, the quaking-aspen is reduced to a f. *nana*, 6 to 10 feet high, stems branching from the base upwards, with the small leaves, and red petioles.

CONIFERÆ. *Picea Engelmanni*, below the lakes; and *P. pungens*, near the Micawber, as well as *Juniperus communis* var.

alpina. A *Pinus* doubtfully referred to *flexilis* occurs near the Micawber Mine.

LILIACEÆ. *Allium reticulatum* and *Streptopus amplexifolius*, near the lakes, the first being characteristic of high altitudes. *Zygadenus*, near the Micawber, and also *Allium cernuum* f. *obtusum*, with rose-colored flowers, and obtuse perianth-segments.

JUNCACEÆ. *Juncus Mertensianus*, at the lakes, and *Luzula parviflora*, near Brush Creek.

CYPERACEÆ. *Carex Gayana* and *C. atrata* v. *ovata*, near Brush Creek.

GRAMINEÆ. *Bromus ciliatus*, *Agrostis niemalis* and *Elymus Americanus*, near Brush Creek. *Phleum pratense*, is a "casual" near the Micawber.

HEPATICÆ. *Marchantia polymorpha*, at the Micawber.

FUNGI. *Hypocrea Richardsoni*, *Melampsora salicina*, *Phragmidium subcorticium* and *Lycogala epidendrum*, near the Micawber. I observed, and have made descriptions of, seven species of *Agaricus*, one *Coprinus*, and one *Boletus*, but I have not yet been able to identify them.

LICHENES. *Usnea barbata* produces a very striking effect in Swift Creek Gulch and Horseshoe Bend Gulch.

The features of an alpine flora are very striking as compared with those of lower altitudes. Many orders and genera, so abundantly represented further down, are here only conspicuous by their absence. Such plants as the gentians and saxifrages become abundant. The prevalent colors change; blue and pink flowers become commoner, yellows and reds more rare. Nor is this phenomena in any way confined to our present district: Mr. F. W. Anderson, whom I questioned on the matter, wrote me that he had observed the same thing in Montana.* Hereafter, I hope to be able to elucidate this matter more fully. It is of great interest, as here, at any rate, we seem to see the manifest result of environment in inducing changes which finally become sufficiently fixed to produce new species. In my former paper on *Castilleia* I have shown how pink replaces scarlet; in this paper some interesting cases of color-variation are recorded, but many more instances might be given, illustrating the effect of altitude. Dr. Weismann, whose views on the non-inheritance of acquired characters are now exciting so much attention, has considered it not unlikely that changes in organisms produced by climatic influences may be inherited, a reservation which seems to be endorsed by all experience.

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* Mr. Anderson wrote, (December 4th, 1889)—"Yes, blues and pinks do seem to replace yellows and reds in alpine regions, and not necessarily high alpine either; but our difference in latitude may make up for the lack of extremely high altitude. Examples you ask for! Phloxes, Lupins, Asters, Erigerons, Gentians, Astragali, Pentstemons, Delphiniums."

Dr. A. R. Wallace, in "Darwinism," (p. 401), remarks on the apparent scarcity of monocotyledonous plants in the Rocky Mountains. Although published works, and indeed this present list, would seem to confirm this view, I do not think it is actually the case; the grasses, etc., of high altitudes in the West not yet having received the same amount of attention as those of the eastern or northeastern regions. When we know the flora completely, surely the percentage of Rocky Mountain monocotyledonous plants will be increased. Dr. George Vasey seems to be of the same opinion, for he writes me, (March 8th, 1890): "It appears to me that monocotyledonous plants are as numerous proportionately in high altitudes as in lower ones." Dr. Wallace himself, to whom I stated my objection, replies, (February 10th, 1890): "In the Rocky Mountains I think there is a real scarcity of monocotyledons, especially bulbous Liliaceæ, Amaryllids and Orchises. This struck me as being the case."

No doubt, excluding the grasses and carices, this may hold good, at least with regard to the comparison of very high altitudes with rather more moderate ones. But in the Wet Mountain Valley, (about 8,000 feet), there are eight species of orchids.

I made a catalogue of the high altitude plants mentioned in Dr. Britton's lists of Dr. Rusby's South American gathering, and although the result is interesting, it is not suitable for comparison with the present list, as from the plants listed, 10,000 feet near La Paz would seem to correspond climatically with about 7,000 feet, (or perhaps lower), in Colorado.

West Cliff, Custer Co., Colorado.

A Comparative Study of the Styles of Compositæ.*

By J. S. Chamberlain.

(Plates CXVII and CXVIII.)

The order Compositæ contains more species than any other order of the flowering plants. Bentham[1] estimated the number of species known to him at nearly ten thousand. They are distributed in seven hundred and fifty genera, collected into thirteen tribes.

The two hundred and thirty-five genera native to North America are distributed in eleven tribes, and according to Dr. Gray[2] comprise one-eighth of the Phænogams of the continent.

Although the order contains so many species, it is so remarkably distinct and uniform throughout that a species is seldom wrongly referred to or excluded from it.

But to correctly place these ten thousand species in their proper genera, and these in their proper tribes, has been an immense undertaking for systematic botanists. It has been necessary to use characters derived from almost every part of the flower, differences in the inflorescence, corolla, pappus, appendages of the anthers, style, sexual differences, etc., many of which in other orders are considered of only secondary importance.

Linnæus, who arranged the Compositæ into four great tribes, based his classification on sexual differences. Henri Cassini[3] undertook a revision of the order, and in his classification made use of the style characters for the first time. Lessing[4] and De Candolle[5] made revisions of the order. They, more than Cassini, made use of the style characters. Great and valuable work has been accomplished by Dr. Gray, who in his various works on North America Botany has made use of the style characters in distributing the Compositæ. Bentham[6] who carefully revised the order for the "Genera Plantarum" after considering all points says: "The style branches of the hermaphrodite florets afford one of the most useful characters for the determination of genera and some tribes; but all attempts to take it as absolute have hitherto miserably failed, and it must always be considered in combination with other characters." The character of the venation of the corolla, used by David Don[7] and the differences of the achenium used by G. Schultz Bipontinus, were considered of great importance by these authors.

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* Among the most convenient characters for separating tribes of the Compositæ is the structure of the style, but teachers seldom use this. With the hope that teachers will use this character more generally Mr. Chamberlain has studied in my laboratory the principal tribes and genera in Gray's Manual. The results of his labors are presented here.—L. H. Pammel.

[1] Notes on Compositæ, p. 336.

[2] Synoptical Flora of North America, p. 49.

[3] Opuscules Botaniques.

[4] Syn. Generum Compositarum.

[5] Prodromus.

The pappus, which has been used somewhat, is of much greater diagnostic value than the achenium, as it is constant in species and in natural genera and tribes.

The appendages of the anthers, which are attached either to the base or the apex in some genera and tribes, are of some value. Peculiarities of the corolla also furnish characters which are of some importance.

The styles in different genera of the order, deviate sufficiently in structure to enable us to use them for tribal or generic characters, and a study of their structure is the subject of this paper.

The styles of the perfect hermaphrodite flowers of the Compositæ are two-branched and furnished with two kinds of hairs, viz., stigmatic papillæ and brush hairs. The stigmatic papillæ are on the inner face of the style branches, arranged in one line, as in *Vernonia* or *Helianthus*, or in two lines, as in *Helenium* or *Aster*, and extend up from the base of the branches to the tip, as in *Vernonia*, or for only a part of the distance, as in *Eupatorium* and *Aster*. The papillæ are usually short, with either an acute or obtuse tip, but never acuminate.

The brush hairs, or collecting hairs as they are sometimes called, are arranged in several ways, e. g., in a truncate bunch at the tip of the branch, as in *Senecio;* or along the outer face of the branches, extending sometimes below the fork, as in *Vernonia*, and sometimes just to the fork, as in *Solidago;* or covering both faces of the branch above the termination of the stigmatic lines as in *Aster*. The function of the brush hairs is to brush out and collect the pollen from the anther tube.

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[6] L. c.

[7] Monographs on Compositæ.

Before the flower opens the style branches are closed within the flower. The lines of stigmatic papillæ are closed in against each other on the inner face of the style branches and thus remain unexposed until after the flower opens and the branches separate.

When the flower opens the style pushes up through the anther tube and the brush hairs brush out and collect the pollen as the anthers dehisce.

The pollen thus held by the brush hairs is usually removed by insects before the stigmatic papillæ are exposed. Self-pollination is therefore not likely to occur. As the style grows, the branches separate, often curving far back, and the stigmatic papillæ are in a position to be readily pollinated by insects. By this mechanism cross-pollination of the Compositæ seems almost certain, though self-pollination does occur.

In *Xanthium*, which is anemophilous, the brush hairs are not needed, and consequently they are more or less abortive.

In the female flowers the style is always two-branched, but brush hairs are absent, as they would be useless. The stigmatic papillæ cover the entire inner face of the branches or are arranged in two lines. Some exceptions occur, however, as in *Inula*[8] where the style of the pistillate ray flowers is like that of the hermaphrodite flowers.

In male flowers the style is either entire or two-branched sometimes both forms occurring in the same genus. The pistil being sterile it has no function to perform except that of removing the pollen from the anther tube, and consequently we find brush hairs but no stigmatic papillæ.

Cassini[9], Lessing[10], De Candolle[11], and Lindley[12], in their classifications seem to have noticed only the variations in the shape of the branches, while the differences in arrangement, size, shape, etc., of the brush hairs and the stigmatic papillæ was unnoticed. Le Maout and Decaisne[13], Bentham[14] and Gray[15] all notice the brush hairs and stigmatic papillæ to some extent, the latter using them for distinct tribal characters.

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[8] Lubbock :—British Wild Flowers in Relation to Insects, p. 115.

[9] L. c. [10] L. c. [11] L. c. [12] Flora Medica, p. 450.

[13] Descriptive Botany, p. 497.

[14] L. c., p. 349. [15] L. c., p. 49.

F. Hildebrand[16], who has given a thorough description, with plates, of the genera studied by him, notices the brush hairs and stigmatic papillæ closely, the purpose of his paper being to point out the mechanism for pollination.

Bentham and Hooker in "Genera Plantarum" divide the order Compositæ into thirteen tribes, of which ten are included in the revised edition of Gray's New Manual, as follows: 1 *Vernoniaceæ*, 2 *Eupatoriaceæ*, 3 *Asteroideæ*, 4 *Inuloideæ*, 5 *Helianthoideæ*, 6 *Helenioideæ*, 7 *Anthemideæ*, 8 *Senecionideæ*, 9 *Cynaroideæ*, 10 *Cichoriaceæ*. In Gray's "Synoptical Flora of North America" one other tribe is given, viz: *Mutisiaceæ*. In the arrangement of tribes I have followed Gray. In most cases the genera in each tribe are taken up as they appear in the Manual.

VERNONIACEÆ (plate CXVII fig 1–6).

Of the Vernoniceæ Gray says: "Style branches slender, filiform or attenuate subulate, acute, hispidulous or hispid; stigmatic lines only near the base."

Bentham says: "Stigmatic lines near the base on the inner surface not very conspicuous."

I do not, however, find the arrangement of the stigmatic papillæ as they are described by these authors.

In *Vernonia* and *Elephantopus*, the stigmatic papillæ are arranged in one line, occupying about one-third of the inner face of the branches and extending up the center of this face from the base to within a very short distance of the tip.

This is nearly as Hildebrand[17] has described it except that a single stigmatic line occupies the whole inner face. The stigmatic lines are very distinct and are essentially the same in *Vernonia* and *Elephantopus*. The papillæ in both genera are short, broad at the base and taper to an acute point. The brush hairs cover the entire surface not covered by papillæ and extend for some distance below the forks.

Vernonia[18] (Fig. 1-5).

V. Arkansana, DC. The branches of the style are terete, long, (about one-fourth the length of the style) slender, tapering gradually to an acute tip. The arrangement of papillæ and hairs is as described for the tribe. The brush hairs (fig. 5) are large, linear and taper to an acute tip. They extend below the forks about two-thirds the length of the branches and cover the surface thickly.

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[16] Ueber die Geschlechtsverhältnisse bei den Compositen.

[17] L. c., p. 14.

[18] Hildebrand l. c., p. 14. Cassini l. c., p. 22.

Elephantopus (Fig. 6).

E. Carolinianus, Willd. The branches of the style are much like those of *Vernonia* except in an obtuse tip. The brush hairs (fig. 6) taper rapidly to an acuminate tip and are only about one-half the length of those of *Vernonia Arkansana*. The brush hairs extend below the forks for only about one-fourth the length of the branches.

EUPATORIACEÆ (plate CXVII, fig. 7–23).

Gray[19] says: "Style branches elongated, more or less clavate or thickened upward, minutely papillose or puberulose or glabrous; the stigmatic lines only near the base and inconspicuous."

In three of the six genera studied the style was very plainly club-shaped. In the others it was merely more cylindrical above the end of the stigmatic lines. The clavate character of the branches is, therefore, not uniform for all the genera of the tribe, as stated by some. They are either clavate or mostly cylindrical above. Stigmatic lines only near the base is true in most cases.

In some genera, however, as in *Mikania*, the stigmatic lines extend up for more than two-thirds the distance. A uniform character was, however, found in all six genera studied, namely, the stigmatic lines are always very narrow along the outer edges of the branches and the brush hairs cover the entire surface or the greater part of it above the end of the stigmatic lines.

Kuhnia (Fig. 7–11).

K. eupatorioides, L. Style branches distinctly club-shaped, as shown in figs. 7–9. The stigmatic papillæ (fig. 11) are arranged in two narrow lines along the edges of the branches and occupy the lower three-sevenths of the branches. The papillæ are moderately large and acute. The brush hairs (fig. 10) cover almost the entire surface above the end of the stigmatic lines. They are very obtuse and broad.

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[19] L. c., p. 51.

Mikania (Fig. 12–14a).

M. scandens, (L.) Willd. Style branches (fig. 12–13) are not clavate as in *Kuhnia*, but are cylindrical above the end of the stigmatic lines. The stigmatic papillæ (fig. 14a) are arranged in two lines as in *Kuhnia*, but are wider and occupy fully two-thirds of the length of the branch. In shape they differ only slightly from *Kuhnia*. The brush hairs (fig. 14) are larger and more acute than in *Kuhnia*. They do not cover the entire surface, but leave a narrow uncovered portion along the center of the branch.

Eupatorium[20] (Fig. 15-16).

Eupatorium altissimum, L. The style branches are distinctly clavate. Stigmatic papillæ (fig. 16) are arranged as in *Kuhnia* and occupy the lower two-fifths of the branch. The brush hairs (fig. 15) cover nearly the entire surface above the end of the stigmatic lines. The largest hairs are just above the end of the stigmatic lines.

According to Cassini, as quoted by Hildebrand, the styles of *Eupatorium purpureum*, *E. sessilifolium*, and *E. altissimum* are like *Eupatorium cannabinum*.

Brickellia (Fig. 17-18).

B. Wrightii, Gray, var. *tenera*, Gray. The style branches are nearly like those of *Kuhnia*, only becoming more gradually clavate, while the tip is more acute. Stigmatic papillæ (fig. 18) are nearly like those of *Kuhnia* in shape, size and arrangement. The brush hairs (fig. 17) are like those of *Kuhnia* in all respects.

Liatris (Fig. 19-20).

L. squarrosa, (L.) Willd. The style branches are not clavate, but the upper part is very long and cylindrical. The stigmatic lines, which are very narrow at the base of the branches, become somewhat broader before they terminate. They occupy only about one-third of the length of the branch (fig. 20). The brush hairs are arranged as in the other genera. In the full grown style they are broad at the base, and taper to a rather acute point (fig. 19). According to Hildebrand[21] they are long and slender before the flower opens, later they become broader at the base, but do not grow in length.

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[20] Hildebrand l. c., p., 16.

[21] L. c., p. 17.

Trilisia (Fig. 21-23).

T. paniculata (Walt.) Cass. Style branches not clavate but cylindrical longer and more acute than in *Mikania*. Stigmatic papillæ (fig. 23) about the same as in *Mikania*, but occupy only one-third of the branch, and are in slightly narrower lines. Brush hairs (fig. 21, 22) cover the entire surface above the stigmatic lines.

ASTEROIDEÆ (plate CXVIII, fig. 1-38).

Gray[24] describes the style as follows: "Style branches of hermaphrodite flowers flattened, conspicuously margined by the stigmatic lines and extending into a hispid or papillose (sometimes very short) appendage."

The following genera have been studied: *Grindelia*, *Heterotheca*, *Chrysopsis*, *Aplopappus*, *Bigelovia*, *Solidago*, *Brachychæta*, *Bellis*, *Townsendia*, *Sericocarpus*, *Aphanostephus*, *Boltonia*, *Aster*, *Erigeron* and *Baccharis*.

In all these the style agrees with the description given by Dr. Gray for the tribe. There is a difference, however, in the arrangement of the stigmatic papillæ and brush hairs that makes the following division of the tribe possible, so far as my studies have extended.

DIVISION I.

Style branches of the hermaphrodite flowers flattened, tapering from the base or just above the base to an acute or obtuse point. The stigmatic lines are distinct in two lines along the outer edges and tip. They occupy not more than one-half of the branch. The brush hairs covering the outer surface extending down between the stigmatic lines or leaving an unoccupied space along the center. The inner face is not covered with brush hairs except at the very tip and along the edges. This subdivision includes the genera: *Solidago*, *Grindelia*, *Heterotheca*, *Chrysopsis*, *Aplopappus*, *Bigelovia*, *Brachychæta*, *Bellis*, *Townsendia* and *Sericocarpus*.

DIVISION II.

Style branches flattened, linear from the base to the end of the stigmatic lines. Stigmatic papillæ in two lines as in (I), but occupying more than one-half of the length of the branch. The brush hairs forming a triangular appendage at the end of the stigmatic lines and nearly equally covering both faces of the branch. The hairs on the outer face extend only a short distance below the end of the stigmatic lines. This subdivision includes the genera *Aster*, *Aphanostephus*, *Erigeron* and *Boltonia*. *Baccharis* has both staminate and pistillate flowers, and does not belong to either of the above.

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[24] L. c. p. 52.

Solidago[23] (plate CXVIII, fig. 1-3).

S. Canadensis, L. The general characters of the style have been given in the description of subdivison I. The stigmatic lines extend up a little less than one-half of the distance to the tip (fig. 1, 2). The brush hairs cover the entire outer surface, and the tip and edges of the inner face above the stigmatic lines (fig. 1, 2). Stigmatic papillæ short, acute. Brush hairs long, cylindrical and obtuse. The shape and relative size of both papillæ and hairs is shown in figure 3.

Grindelia[25] (Fig. 4, 5).

G. squarrosa (Pursh), Dunal. Style branches much like *Solidago*, only longer and not as broad, gradually tapering to an obtuse point. Stigmatic lines occupy one-half of the length of the branch. Stigmatic papillæ (fig. 5) more slender than in *Solidago*. Brush hairs (fig. 4) do not extend as far down the back as in *Solidago*.

Heterotheca[26] (Fig. 6, 7).

H. subaxillaris (Lam.), Britt. Style branches enlarged at the base and tapering to a smaller point than in *Solidago* or *Grindelia*. Stigmatic lines occupy one-half of branch. Brush hairs do not occupy outer or inner face entirely, but leave a narrow zone along the center of both faces. Stigmatic papillæ shorter and more obtuse than in *Solidago* (fig. 7). Brush hairs broader and shorter (fig. 6).

Chrysopsis[24] (Fig. 8, 9).

C. villosa (Pursh), Nutt. Style branches almost identical with those of *Heterotheca.* The brush hairs (fig. 9) are arranged as in *Heterotheca.* The papillæ (fig. 8) are arranged similarly, but are longer and more acuminate.

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[23] Hildebrand, l. c., p. 22. Müller, l. c., p. 320.

[25] Gray, l. c., p. 53.

[26] Gray, l. c., p. 53.

[24] L. c., p. 53.

Aplopappus (Fig. 10, 11).

A. racemosus (Nutt.), Torr. Style branches longer and more tapering than in *Solidago.* Stigmatic papillæ (fig. 11) are about the same shape as in *Solidago*, and occupy one-third of the branch. The brush hairs (fig. 10) are of very different lengths, the largest being larger than any others in the tribe.

Bigelovia (Fig. 12, 13).

B. nudata (Michx.), DC. Style branches slightly broader than in *Heteratheca.* The stigmatic lines occupy hardly one-half of the branch. The papillæ (fig. 13) about as in *Solidago.* Brush hairs (fig. 12) broad and obtuse.

Brachychæta (Fig. 14, 15).

B. cordata (Short), Torr. & Gray. Branches of the style short and obtusely pointed. Stigmatic lines occupy one-third of the branch. The papillæ (fig. 15) are smaller than in *Solidago.* Brush hairs (fig. 14) broader and shorter.

Bellis[27] (Fig. 16, 17).

B. integrifolia, Michx. Style branches essentially as in *Solidago.* Stigmatic lines occupy a little more than one-third of the branch. The papillæ (fig. 17) are smaller than in *Solidago*, while the brush hairs (fig. 16) are broader and shorter.

Townsendia[28] (Fig. 18, 19).

T. eximia, Gray. Style branches long and tapering. Stigmatic lines occupying one half of branch. The papillæ (fig. 19) are smaller than in *Solidago.* Brush hairs (fig. 18) acuminate as in *Chrysopsis.*

Sericocarpus[29] (Fig. 21, 21a).

S. asteroides, (L.) B.S.P. Styles branches very long and slender, about twice the length of *Solidago.* Stigmatic lines occupy about one-fourth of the branch. See figure 21 for papillæ. The brush hairs are shown at figure 21a.

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[27] Gray, l. c., p. 55. Müller, l. c., p. 321. Hildebrand, l. c., p. 23.

[28] Gray, l. c., p. 56.

Gray, l. c., p. 56.

DIVISION II.

Aster[30] (plate CXVIII, fig. 22-28).

A. Novæ-Angliæ, L. The style branches of the hermaphrodite flowers are about the same length as those of *Solidago*, but are flattened and much narrower. The stigmatic lines are broader and more distinct than in the first division. They occupy two-thirds of the branch. The branches are linear to the end of the stigmatic lines; above this portion of the branch the brush hairs form a triangular appendage, the hairs almost covering both faces, extending down somewhat between the lines on the outer face (fig. 22, 23). The papillæ (fig. 28) are short and obtuse. Brush hairs (fig. 27) are rather short and broad. The style branches of the pistillate ray flowers are narrow and acuminate, while the papilllæ occur in two lines along the edges, the brush hairs being absent (fig. 24-26).

Erigeron (Fig. 29-33).

E. Philadelphicus, L. Style branches about one-half as long as in *Aster*. Stigmatic lines occupy two-thirds of the branch, brush hairs covering both faces above the end of the stigmatic lines and forming a triangular appendage (fig. 29-31). The stigmatic lines are narrower and the papillæ larger than in *Aster* (fig. 33). Brush hairs are shorter and more obtuse (fig. 32).

Aphanostephus[31] (Fig. 34, 35).

A. ramosissimus, DC. Style branches like those of *Erigeron*, but only half as long. Stigmatic lines occupy three-fourths of branch. The appendage of the brush hairs is very short. The papillæ are smaller than in *Erigeron* (fig. 35), whereas the brush hairs are narrower and more obtuse (fig. 34).

Boltonia[32] (Fig. 36, 37).

B. asteroides (L.) L'Her. Style branches very broad in proportion to their length, being about one-third as broad as they are long. In length they are like those of *Erigeron*. Stigmatic lines occupy four-fifths of the branch. The brush hairs form a mucronate-pointed appendage. The papillæ (fig. 37) and brush hairs (fig. 36) are nearly like those of *Erigeron*.

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[30] Gray, l. c., p. 56.

[31] Gray, l. c., p. 55.

[32] Gray, l. c., p. 56.

Baccharis[33] (Fig. 20, 38).

B. halimifolia, L. Style branches of the staminate flower are shown in figure 38. The entire outer face and edges of the inner are covered with brush hairs. Stigmatic papillæ do not occur on the remainder of the inner face. The brush hairs are cylindrical, obtuse (fig. 20).

The branches of the pistillate flowers are twice as long as in the staminate. They are linear in shape, with an acute point. The papillæ occur in two narrow lines along the edges.

INULOIDEÆ[34] (plate CXVIII, figs. 39-44).

In this tribe the heads are heterogamous or diœciously homogamous, and the style, therefore, in most cases, does not possess both brush hairs and stigmatic papillæ; the relative arrangement of the brush hairs cannot therefore be used as a distinctive character. The style of the hermaphrodite sterile flowers is either two-branched or entire. The style of the pistillate flowers is two-branched, but there is no variation in the arrangement of the papillæ. Gray says: "The style branches of the hermaphrodite flowers are flattish or filiform, not appendaged."

Pluchea[35] (Figs. 39, 40).

P. camphorata, (L.) DC. The style of the hermaphrodite sterile flowers is entire or two-cleft. The branches of the two-cleft style are terete, short in proportion to their length. The brush hairs cover the entire outer surface of the branches. Below the base of the branches the style is covered with glands (fig. 39). The brush hairs (fig. 40) are short and obtuse. The style of the pistillate florets is two-branched, with both faces covered, or nearly so, with papillæ.

Antennaria[36] (Figs. 41-44).

A plantaginifolia (L.), Hook. The style of the staminate flowers is two-cleft or entire. The branches of the two-cleft style are somewhat clavate, covered over the outer face and edges of the inner with brush hairs. The remainder of the inner face does not possess stigmatic papillæ (fig. 41). The brush hairs (fig. 42) are short and obtuse. The style of the pistillate flowers is two-cleft. The branches are slightly tapering, the stigmatic papillæ cover the greater part of both faces (fig. 43). The papillæ are small and obtuse (fig. 44).

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[33] Gray, l. c., p. 57.

[34] Gray, l. c., p. 57. Bentham, l. c., p. 377. Lubbock, l. c., p. 115. Hildebrand, l. c., p. 40.

[35] Gray, l. c., p. 57.

[36] Gray, l. c., p. 58.

(*To be continued*).

Notes on the Flora of North Carolina.

By A. A. Heller.

The morning of June 19, 1890, found me in the "Old North State," whither my imagination for many months past had carried me almost daily.

On the road to my headquarters near Heilig's Mill post-office, twelve miles south of Salisbury, many things besides the heat of the sun indicated that I was in a part of the world which was new to me.

Ripe blackberries in June were a novelty, and one that claimed my attention from an internal point of view. Great bunches of the brick-red flowers of *Tecoma radicans*, Juss., were plentiful along the road, and so were those of the pretty, purple-rayed *Passiflora incarnata*, L. But the prettiest of all was *Schrankia angustata*, T. and G., with its heads of pink flowers.

On the 20th I did my first collecting, on the road from Salisbury to Heilig's Mill. *Polygala Curtissii*, Gray, was just coming into bloom, and a few plants of *Silene Virginica*, L., and *Asclepias verticillata*, L., were found. A plentiful supply of *Bupleurum rotundifolium*, L., was obtained at one place, and a stop of a few minutes at the "Rocks," six miles south of Salisbury, added *Ilysanthes refracta*, Benth., and *Utricularia cornuta*, Mx., to my list.

On the 21st I made an expedition with the "Parson" to his Bear Creek congregation, twelve miles farther south, and while he was dispensing spiritual food in the shape of catechism, I explored the vicinity. Some of the more important results were: A fruiting specimen of *Rhododendron calendulaceum* (Michx.) Torr. *Coreopsis senifolia*, Mx., which was plentiful, several specimens each of *Clitoria Mariana*, L., and the short, erect form of *Tephrosia* *spicata*, T. and G., a *Cratægus* which further investigation may prove to be a new species, *Aletris farinosa*, L., and *Panicum viscidum*, Ell.

On the 28th I had an opportunity of spending an hour or two at the "Rocks." This is a section of serpentine, if my limited knowledge of geology is not at fault. Large boulders lie scattered around, and on a level with the surface are large flat rocks of the same formation, some of them many square feet in extent. Nearly all of these were covered with lichens, especially a species of *Cladonia.*

On some of them I found *Talinum teretifolium*, Pursh, *Crotonopsis linearis*, Mx., and the withered stalks of what seems to be an *Arenaria.*

In the serpentine belt I found, in addition to the plants above mentioned, *Yucca filamentosa*, L., in fruit, *Marshallia lanceolata*, Pursh, *Gratiola pilosa*, Mx., *Callicarpa Americana*, L., and *Polypodium incanum*, Pursh, while on its borders were *Parthenium integrifolium*, L., *Oxydendrum arboreum* (L.), DC., *Psoralea melilotoides*, Mx., *Lobelia Nuttallii*, R. and S., and two forms of *Viburnum nudum*, L.

Another trip on the 4th of July as far as the southern borders of this section yielded such things as *Jatropa urens*, L., var. *stimulosa*, Muell., *Rhynchosia erecta*, DC , *Polypremum procumbens*, L., the long, trailing form of *Tephrosia spicata*, T. and G., *Rhexia Mariana*, L., *Eriocaulon decangulare*, L., and *Xyris Caroliniana*, Walt.

Little expeditions within a radius of a mile or two of headquarters brought forth some pretty good things.

In the woods a short distance below the house I found a number of fine plants of *Clematis ochroleuca*, Ait. In another place on the edge of a field is a large patch of *Thymus Serpyllum*, L., which must have escaped from the church-yard about one hundred yards east of it.

Delphinium Ajacis, L., is rather common, one field especially being almost blue with it. This plant I have sent out under the name *D. Consolida*, L., but a more careful study of it has shown that the latter name is wrong.

The question is, Is *D. Consolida* found at all in the South, or has *D. Ajacis* been mistaken for it thus far?

In some of the fields there was an abundance of *Gnaphalium purpureum*, L., which is not simple, like the form found in the North, but profusely branching from the base, there being a dozen or more stalks from one root.

Silphium Asteriscus, L., was found along the "branch" west of the church, but not abundantly.

On a little slope just east of the churchyard is a small tree of *Cratægus spathulata*, Mx. The fruit of this, as well as that of all the others which I found, except *C. flava*, Ait., was covered with a pink fungoid growth resembling little spines. Near by were *Hypericum virgatum*, Lam., and *Pentstemon lævigatus*, Soland. The latter plant, which I found at several places in the vicinity, but in fruit only, seems to be the typical one.

Ruellia ciliosa, Pursh, was not uncommon in the woods and along the roadsides, while in old fields there was an abundance of *Cyperus ovularis* (Vahl.), Torr., and *Lechea tenuifolia*, Mx. In a moist place in a woods were three plants of *Amianthium muscætoxicum* (Walt.), Gray.

Some other plants of the vicinity are *Sabbatia paniculata*, Pursh, *Lechea racemulosa*, Lam., *Crotalaria sagittalis*, L., *Paspalum Floridanum*, Mx., *Ascelpias variegata*, L., *Vaccinium arboreum*, Mx., *Bletia aphylla*, Nutt., *Agave Virginica*, L., and *Linum striatum*, which latter, according to the last edition of Chapman, has been found only in South Carolina.

On the 17th of July I started for the mountains, taking the Western North Carolina Railroad from Salisbury to Hickory, there changing to the narrow gauge road which runs from that place to Lenoir. From Lenoir to Blowing Rock, a distance of twenty miles, one must travel by stage, about half the distance being up the mountain.

As this was my first visit to the mountains, I enjoyed the ride very much. At two places where the road winds along the mountain side, there are splendid views. In front Grandfather towers above all the rest like a huge sentinel, with perchance a cloud floating over its summit. Father to the left are Hawk's Bill and Table Rock, while sweeping around in a great semicircle is a sea of mountains, which far away on the horizon seems to lose itself among the clouds.

Blowing Rock is a summer resort, situated almost on the backbone of the Blue Ridge, at an altitude of 4000 feet. The Blowing Rock itself is one of a series of ledges which jut out along the mountain side. There is generally a stiff breeze blowing over it from the trough-like valley below; hence its name.

My first botanizing was done on its ledges, and I was well pleased with the result. *Saxifraga leucanthemifolia*, Mx., was not plentiful, but more vigorous than at any other place where I saw it. *Heuchera villosa*, Mx., *Amianthium muscætoxicum* (Walt.), Gray, *Sedum telephioide*s Mx., *Potentilla tridentata*, Ait., *Clethra acuminata*, Mx., and *Carex æstivalis*, M. A. Curtis, were represented, as was also the beautiful *Paronychia argyrocoma*, Nutt., which grew in mats upon the rocks. There was also a peculiar form of *Allium cernuum*, Roth., with deep pink-purple flowers.

In the woods back of the rocks I found *Galium latifolium*, Mx., *Galax aphylla*, L., *Danthonia compressa*, Austin, the typical form of *Houstonia purpurea*, L., *Tradescantia pilosa*, Lehm., and *Pentstemon lævigatus*, Soland., which is quite different from the one collected in the vicinity of Salisbury. This one grows much taller, has larger and thinner leaves, and dark pink flowers. The flowers, however, were scarce, but there was plenty of good fruit.

Down in the dark, shady hollow below the rocks were *Melanthium parviflorum* (Mx.), Watson, and *Spiræa Aruncus*, L., with their Northern neighbors, *Orchis spectabilis*, L., and *Clintonia borealis* (Ait.), Raf.

Early on the morning of the 22d I started to tramp to Grandfather Mountain, fifteen miles distant. The first thing collected was *Trillium erythrocarpum*, Mx., in fruit. Along the roadside in a shady nook, where a tiny stream trickles into a depression in a large moss-covered rock, were some nice specimens of *Thalictrum clavatum*, DC.

Before arriving at the Watauga river, I found *Actæa alba*, Mill., *Campanula divaricata*, Mx., *Silene Virginica*, L., *Phlox paniculata* L., *Blephilia hirsuta*, Benth., and *Pycnanthemum montanum*, Mx.

At Scholl's Mill the road turns to the left, following the banks of the Watauga. At one place I picked up a single plant of *Chelone obliqua*, L., and further on, near the foot of Grandfather, a plant of *Corallorhiza multiflora*, Nutt., which is not at all plentiful in that section, and I believe never found before in North Carolina, although it has been reported from Tennessee by Dr. Gattinger.

Climbing Grandfather is a feat not to be despised, especially by one who is trying such a thing for the first time. It was slow and toilsome work, but soon a little inspiration was given by the finding of a patch of *Goodyera repens*, (L.), R. Br.

About half way up is what may be termed the moss belt, for the ground, trunks of trees, logs and rocks, are covered with a thick cushion of moss, and growing in it was *Oxalis Acetosella*, L., with its pretty pink-veined petals.

A half mile from the summit is a spring of almost ice-cold water, which flows from the base of a large cliff. Here was *Carex canescens*, L., var. *alpicola*, Wahl., and *Glyceria elongata*, (Torr.), Trin., hitherto reported only from Roan.

What we may call the first landing of the summit was covered with *Saxifraga leucanthemifolia*, Mx., and *Clintonia borealis* (Ait.), Raf. From the spring until almost to the summit, were large patches of *Chelone Lyoni*, Pursh, its pink-purple flowers making a very pretty appearance. *Monarda didyma*, L., was also well represented, while upon the summit was an abundance of dwarf *Aster acuminatus*, Mx.

Streptopus roseus (Pers.), Mx., *Diphylleia cymosa*, Mx., *Hydrangea arborescens*, L., and *Viburnum lantanoides*, Mx., were found at different points along the trail. But the crowning point was the finding of *Aconitum reclinatum*, Gray, a short distance below the spring.

The wet weather interfered much with my collecting, for it rained during the greater part of the time that I spent in the mountains. Nevertheless I managed to do a little collecting around Blowing Rock, and on the eastern slope of the mountain found *Leiophyllum buxifolium* (Berg.), Ell., *Microstylis unifolia* (Mx.), B.S.P., two plants of *Corallorhiza multiflora*, Nutt., *Habenaria ciliaris*, (L.), R. Br., and a slender, large-leaved form of *Œnothera fruticosa*, L.

On the western slope, facing the head-waters of John's river, were *Leucothoë recurva*, Gray, *Pyrus arbutifolia* (L.), L.f., and a few plants of *Asplenium montanum*, L.

Goodyera pubesceus (Willd.), R. Br., was also found on the mountain top.

On the 1st of August, taking advantage of the clear weather, I started for Table Rock, thirty-five miles distant. For ten miles I followed the banks of John's river, and then turned to the right, going across the mountains by way of Wilson's creek and Piedmont Spring. For a part of the distance the road is a mere path, and the way of the traveler is hard, especially when there are no foot bridges, and the only thing that can be done is to "pull off" and wade.

In the woods along the mountain road were occasional plants of *Tipularia unifolia* (Muhl.), B.S.P., at one place a bush of *Pyrularia oleifera*, Gray, and on the crest of Long Mountain a patch of what seems to be a mountain form of *Liatris graminifolia*, Willd. This, and two from Blowing Rock, one of which has turned out to be a new species, I have sent out as *L. spicata* (L.), Willd.

The summit of Table Rock was reached late in the afternoon of the second day. This rock-capped mountain is a peculiar place, and a magnificent view can be had from it.

Less than an hour is a very little time to spend at such a place, but yet I managed to find some interesting things. One of the first things that met my eye was *Scleria triglomerata*, Mx. *Zygadenus leimanthoides*, Gray, was plentiful, as was also *Vaccinium corymbosum*, L., var. *pallidum* (Ait.), Gray. On the very summit were *Pyrus nigra* (Marsh.), Sargent, only a few inches high, but fruiting abundantly, *Hypericum prolificum*, L., with broader leaves than usual, *Calopogon tuberosu* (L.), B.S.P., and *Xerophyllum asphodeloides* (L.), Spreng.

It seems to me that the top of a mountain almost 4000 feet above sea level is a strange place to find some of the things mentioned above.

Another visit to Grandfather on the 11th of August, while on the road to Roan, added *Leiophyllum buxifolium* (Berg.), Ell., var. *prostratum*, Gray, *Solidago glomerata*, Mx., *Geum genicula-*

tum, Mx., *Menziesia globularis*, Salisb., and a small-leaved form of *Houstonia purpurea*, L.

Roan was a failure botanically, as I found very few new plants. I am now fully convinced that the mountain was not to blame, but myself, for my sole object seemed to be to get there, and then turn around and go back. *Alnus viridis*, DC., was very innocently passed by under the supposition that it was our common *A. serrulata.*

The only noteworthy things that I found were *Hypericum graveolens*, Buckley, collected near the hotel among the *Abies Fraseri*, Pursh, *Lycopodium Selago*, L., and *Geum radiatum*, Mx., along the road on the summit, and *Rudbeckia laciniata* (L.), var. *humilis*, Gray, on the slope facing the Grassy Knob.

The region around Salisbury seemed to be doing its best when I returned in the latter part of August, but I could do very little, as my stay was limited to a few days. However, I collected some thirty species, among which were *Lotus Helleri*, Britton, *Fœniculum vulgare*, Gærtn., *Elephantopus tomentosus*, L., and *Pluchea camphorata* (L.), DC., (*P. purpurascens*, DC.)

My summer's work and experience, of which this necessarily much-condensed article is an account, was very pleasant, and I hope to repeat it during the coming summer with much greater results.

LANCASTER, PA.

Index to Recent Literature Relating to American Botany.

Adiantum Peruvianum. (Gard. Chron. ix. 397, fig. 88).

Apios tuberosa, Mch.—Ueber die Bestäubungseinrichtung und den Anatomischen Bau der Blüthe von. E. Loew. (Flora. ii. 160-171, t. vi).

Aster from California.—A new. J. N. Rose. (Bot. Gaz. xvi. 113, pl. xi).

Aster Orcuttii is figured and described as a new species.

Bromeliaceæ Schenckianæ. L. Wittmack. (Beiblatt, Engler's Bot. Jahrb. xiii. No. 29, 8-24).

A list of forty-five species collected by Dr. H. Schenck, in Southern Brazil. *Pitcairnia Dietrichiana*, *Dyckia rubra*, and *Vriesia Schenckiana*, are described as new.

Carolina Wild Flowers. L. Greenlee. (Vick's Mag. xiv. 154, 155, illustrated).

Description and figure of *Asarum Virginicum.*

Calochortus Leichtlinii. (Gard. Chron. ix. 469, fig. 97),

Canada Thistle—The. (Third Ann. Rept. W. Va. Agric. Exp. Sta., 118-121, pl. viii, ix).

This article is designed as an appeal to the farmers to eradicate *Cnicus arvensis*, and illustrations are given of the root-leaves and mature plant, as it was incidently discovered that other plants were known under the common name of "Canada Thistle"; such species, for instance, as *Echium vulgare* and *Dipsacus sylvestris.* The article concludes with a series of questions in regard to common weeds which are all quoted by their popular or local names.

Contributions to the Knowledge of the Germination of some North American Plants. Theodor Holm. (Mem. Torrey Bot. Club, ii. 57-108; 15 plates).

Mr. Holm has given much careful study to the development of herbaceous plants, and some of his results are included in this Memoir, which is an important and valuable contribution to the literature of germination. The species described are *Anemone thalictroides*, *Thalictrum dioicum*, *Ranunculus abortivus*, *R. recurvatus*, *Delphinium nudicaule*, *Sarracenia purpurea*, *Sanguinaria Canadensis*, *Viola palmata*, var. *cucullata*, *Lespedeza violacea*, *L. procumbens*, *Clitoria Mariana*, *Cassia Chamæcrista*, *Rubus hispidus*, *Potentilla Canadensis*, *Saxifraga Virginiensis*, *Dionæa muscipula*, *Thaspium barbinode*, *T. aureum*, *Osmorhiza longistylis*, *Sanicula Marylandica*, *Aralia spinosa*, *Pilea pumila*, *Sabal Palmetto*, *Attalea excelsa*, *Carludovica palmata*, *Agave univittata*, *Eucharis candida*, *Smilax rotundifolia*, *S. glauca*, *Hemerocallis fulva*, *Yucca gloriosa*, *Peltandra undulata*, *Orontium aquaticum*, *Anthurium Andræanum*, *Alisma Plantago*, var. *Americanum.* All these are beautifully figured.

Curcurbit.—A New. A. Cogniaux. (Zoe, i. 368, 369; pl. xi).

Description and plate of a new genus aud species, *Vaseyanthus Rosei.*

Cupressus Macnabiana. (Gard Chron. ix. 403, fig. 90).

Distribution of Northern Plants.—The Relative Altitudes of the

Rocky and Appalachian Mountain Systems as influencing the. Conway MacMillan. (Am. Nat., xxv. 146-150).

Prof. MacMillan calls attention to the fact that the distribution of species of boreal genera in the Rocky Mountain System as compared with the Southern Alleghenies, shows a preponderence of nearly double the number in the former, and accounts for this by the much greater altitude of the western mountains.

Douglas Fir.—The. (Gard. and For. iv. 205, 206, fig. 38).

Earth Stars. F. L. Sargent. (Pop. Sci. News, xxv. 72, 73; illustrated).

A popular illustrated description of *Geaster hygrometricus.*

Egg Plants.—Experience With. L. H. Bailey. (Bull. No. 26, Cornell Agric. Exp. Sta. Illustrated).

This paper begins with a general account of the cultivated varieties, and concludes with a description of their early history and ancestors. *Solanum Melongena*, vars. *esculentum* and *depressum* and *S. integrifolium*, are figured.

Eoichnites and *Ctenichnites*, n. gen. G. F. Matthew. (Trans. Roy. Soc. Can., Sec. iv. 1890. pp. 148-154, illustrated).

The author here describes as markings due to molluscan (?) life, the markings which have heretofore been classed under the vegetable kingdom as *Eophyton* sp.

Eperua Jenmani, Oliv. D. Oliver. (Hook. Ic. Plant. t. 1955).

A new species of this Leguminous genus from British Guiana.

Epichloe Hypoxylon. M. C. Cooke. (Grevillea xix. 80).

According to the specimen in Ellis and Everhardt's N. A. Fungi, this is identical with *Hypocrella atramentosa*, B. and C.

Esenbeckia.—A New Species of. T. S. Brandegee. (Zoe, i. 378; pl. xii).

Description and representation of *E. flava.*

European Aliens in America. A. W. Bennett. (Journ. Bot. xxix. 121).

A short contribution, called forth by the article by Mr. T. D. A. Cockerell on the same subject.

Fomes from Northern Montana.—A New. F. W. Anderson. (Bot. Gaz., xvi. 113, pl. xii).

Fomes Ellisianus, from living trunks and branches of *Shepherdia argentea*, is described and figured as new.

Gentiana Herrediana, Raimondi. D. Oliver. (Hook Ic. Plant. t. 1962).

Collected by Pearce on the Cordillera of Muña, Peru.

Glimpses of Old Herbals. E. L. Sturtevant. (Am. Gard. xii. 257-261, illustrated).

Gloxinia maculata. (Garden, xxxix. 364, 365; with colored plate.

Gymnogrammes. (Garden, xxxix. 369, 370, illustrated).

Contains representations of *G. Peruviana*, var. *argyrophylla* and *G. pulchella.*

Hepaticæ.—A Preliminary List of Pacific Coast. L. M. Underwood. (Zoe, i. 361-367).

An enumeration of 155 species, ranging from Alaska to California and Idaho.

Kantia Vincentina. C. H. Wright. (Journ. Bot. xxix. 107).

A newly described species from St. Vincent, (H. H. Smith, No. 1389), allied to *K. trichomanis.*

Lælia anceps, var. *holochila.* R. A. Rolfe. (Gard. and For. iv. 172, 173; fig. 31).

Lobeliaceæ.—California. Katharine Brandegee. (Zoe, i. 373-377).

Critical notes, including descriptions and questions of nomenclature.

Native Plants in Field, Forest and Garden. (Am. Gard. xii. 281-291; illustrated).

The following are figured: *Goodyera pubescens*, *Habenaria ciliaris*, *Crinum Americanum*, *Viola pedata*, *Stuartia Virginica*, *Quercus virens*, *Shortia galacifolia*, *Calla palustris*, *Zanthorrhiza apiifolia* and *Catalpa speciosa.*

Nebraska Flowering Plants. Goodwin D. Swezey. (Doane College, Natural History Studies No. 1, Pamph. 8vo. pp. 16. Crete, 1891.

This is a list of Nebraska localities for flowering plants in the herbarium of Doane College, based mainly on collections made by Prof. Swezey in a tour through the western part of the State, and by some of his students; 533 species and varieties are enumerated, of which 76 are here first definitely recorded as occurring within the area. The nomenclature is based on the stability of the oldest specific name, "believing that this is the only rule which can lead ultimately to a settled nomenclature." Two binomials are here first proposed: *Petalostemon compactus* (Spreng) (*P. macrostachyus*, Torr.) and *Elymus elymoides* (Raf.), (*E. Sitanion*, Schultes). The original author is cited in parenthesis. The list is an important supplement to Mr. Webber's Flora. N. L. B.

New or Noteworthy Compositæ from Guatemala. John M. Coulter. (Bot. Gaz. xvi. 95–102).

The following are described as new: *Vernonia Salvinæ*, Hemsl., var. *canescens*, *Eupatorium Donnell-Smithii*, *E. Donnell-Smithii*, var. *parvifolium*, *E. lyratum*, *E. Rafaelense*, *E. ageratifolium*, D.C., var. *purpureum*, *Brickellia Pacayensis*, *Aplopappus stoloniferus*, D.C., var. *glabratus*, *Aphanostephus Pinulensis*, *Clibadium Donnell-Smithii*, *Tetragonotheca Guatemalensis*, *Zexmenia dulcis*, *Bidens Antiguensis*, *Senecio Donnell-Smithii*, *S. Ghiesbreghtii*, Hort. Hal. Regel, var. *pauciflorus*, *S. Cobanensis*.

North Carolina Agricultural Experiment Station, Bulletin No. 73. (Pamph. 8vo. pp. 100, illustrated, Raleigh, N. C., Oct. 15, 1890).

This pamphlet is concerned with fodder plants and the following are figured: *Cynodon dactylon*, *Cynosurus cristatus*, *Festuca elatior*, *F. ovina*, *F. duriuscula*, *F. rubra*, *Sorghum Halapense*, *Alopecurus pratensis*, *Arrhenatherum avenaceum*, *Dactylis glomerata*, *Agrostis vulgaris*, *Poa trivialis*, *P. compressa*, *P. serotina*, *P. pratensis*, *P. arachnifera*. *Lolium perenne*, *L. Italicum*, *Anthoxanthum odoratum*, *Trifolium hybridum*, *T. incarnatum*, *Lespedeza striata*, *Medicago sativa*, *M. maculata*, *Phalaris intermedia*, var. *angustata*, *Bromus unioloides*, *B. inermis*, *Panicum sanguinale*, *P. Texanum*, *Tripsacum dactyloides*, *Setaria Italica* and *Paspalum platycaule*.

Notes on North American Willows, VI. M. S. Bebb. (Bot. Gaz. xvi. 102-108).

Critical notes are given upon fourteen species of the genus *Salix*. These notes are intended as corrections and added information to the *Salices* of California since the publication of the botany of the State in 1880.

Notes on the Flora of the Lake Superior Region, IV. E. J. Hill. (Bot. Gaz. xv. 324-331).

The author notes that the red and blue-colored flowers of the Minnesota region are very generally brighter in their hues than in other neighboring localities where clouds or fogs prevail and that white flowers show a tendency to coloration in a greater or less degree. This is attributed, probably, to the brighter skies that obtain in Minnesota, and hope is expressed that further observations upon the subject may be made.

Oxalis—Some American. W. F. Endicott. (Gard. and For. iv. 162 163).

Orchids—A Few Native. Mrs. Preston Lovell. (Amer. Nat. xxv. 248-251).

Pecan—The. E. G. Lodeman. (Am. Gard. xii. 272-276; illustrated).

Hicoria Pecan in cultivation and wild is described and figured.

Pinus del Doctor. (Gard. Chron. ix. 435, fig. 92).

Figure of the cone of *Pinus patula*, var. *macrocarpa.*

Podopterus Mexicanus—Zur Kenntniss von. U. Darmmar. (Engl. Bot. Jahrb, xiii. 486-491 ; illustrated.)

Ranunculus lacustris, Beck and Tracy—The Propagation of. Chas. A. Davis. (Bot. Gaz xvi. 115-118).

On account of observations tending to prove that this plant is truly perennial—the new plantlets, perhaps often mistaken for seedlings, being developed from the nodes of the old stems.

Rhamnus Purshiana. K. P. S. Boyd. (Am. Gard. xii. 247, illustrated).

Under this caption we have a description of *Rhamnus* and a picture of some liliaceous plant, apparently *Disporum.* Evidently someone has blundered.

Proceedings of the Club.

WEDNESDAY EVENING, APRIL 29TH.

The Vice-President in the chair and 20 persons present.

Miss Elizabeth C. Schettler, Miss Mary Foster and Miss Rachel W. Farrington were elected active members.

Dr. Edouard Regel, of St. Petersburg, Russia, was elected an honorary member.

The committee on the Botanic Garden announced that the bill establishing the garden in Bronx Park had become a law, receiving the signature of the Governer of the State.

Dr. Emily L. Gregory read the announced paper of the evening, "On Abnormal Development of *Spirogyra* Cells."

A number of plants sent by Dr. Newberry from Hot Springs, North Carolina, were shown, among them the rare *Disporum maculatum*.

Dr. Britton remarked on the nomenclature of the North American genera of Papaveraceæ, stating that the question of accepting *Diclytra*, Borckh., or *Dicentra*, Bernh., could best be solved by using neither, but by taking up instead *Bikukulla*, Adans., which has priority over either one; likewise, *Capnoides*, Adans., has long priority over *Corydalis*, D.C., and is pretty sure to be restored sooner or later.

TUESDAY EVENING, MAY 12TH.

The President in the chair and 22 persons present.

The following announced papers were read, illustrated by specimens and diagrams: (1) Additions to the flora of Richmond County, N. Y., and (2) Notes on the July flora of Montauk, Long Island, by Arthur Hollick; (3), Notes on the genus *Lespedeza*, by N. L. Britton.

Mr. Lighthipe exhibited cypress knees from Florida, remarking on the lightness of the wood, and stating that from his observations these structures aided the tree in maintaining an erect position in swampy land. He also showed *Castillœa coccinea* from a new station near Rahway, N. J.

The President made the following announcement:

Two prizes, one of $15.00, and one of $10.00, for the best collections of herbarium specimens of flowering plants, exclusive of grasses and sedges, made within 100 miles of New York, during the year 1891. The collections to be made with especial reference to the perfection of the pressed flowers, those of maximum size to be selected in all cases. Fruit to be supplied if possible, and so far as practicable in woody plants from the same shrub or tree furnishing the flowers. The specimens to be named, and the maximum size of flowers and fruit observed to be stated on the labels, dimensions to be given in lines and inches.

The collections to be submitted to the committee on Phanerogamia of the Local Flora for adjudication by November 1st, 1891. No collection of less than 300 species will be received.

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I will have no class in Cryptogamic Botany in Cambridge this summer. It is my plan to collect both Cryptogams and Phaenogams during July to September in the Southern Alleghanies and on the Gulf Coast, making as full sets as possible and giving special attention to plants of economic interest, as Fungi, Grasses, etc. Some photographs of forest trees and other botanical objects may be made. I shall be pleased to correspond with persons interested.

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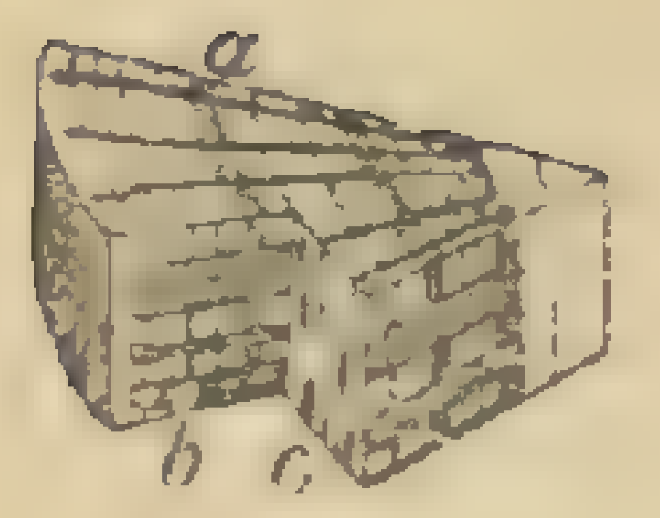

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VOL. XVIII. JULY, 1891. No. 7.

BULLETIN

OF THE

TORREY BOTANICAL CLUB

A MONTHLY JOURNAL OF BOTANY.

EDITED BY

NATHANIEL LORD BRITTON,

AND OTHER MEMBERS OF THE CLUB.

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Members of the Club will please remit their annual dues for 1891, now payable, to Dr. Wm. E. Wheelock Treasurer, 26 E. 68th St., New York City.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XVIII.] New York, July 1, 1891. [No. 7.

A Comparative Study of the Styles of Compositæ.

By J. S. Chamberlain.

Plates CXIX–CXX.

(Continued from page 186).

HELIANTHOIDEÆ (Plate CXIX, Fig. 1-36).

Gray[37] says: "Style branches of hermaphrodite or sterile flowers (or the undivided style in some of the latter) truncate or continued in a hairy appendage."

Bentham[38] says: "Style branches vary in different genera from the truncate tips of the *Senecio* to the appendiculate branches of Asteroideæ, or the subulate hispid branches of Vernoniaceæ."

In this tribe, as stated by Gray and Bentham, there is considerable variation. Yet this variation, as far as my observations go, would enable us to make a division of the tribe, as in Asteroideæ, though not so marked. The styles of the sterile hermaphrodite disk flowers are undivided, except in *Polymnia*, with a truncate bunch of brush hairs, or the brush hairs covering the entire surface. These characters are constant in all genera I have studied. The style of the pistillate flowers is also uniform, being either two-branched with the branches linear, acute with stigmatic papillæ in two rather wide lines along the edges, or they occupy the entire inner surface. In all cases the style of the fertile hermaphrodite flowers is two-branched. The stigmatic papillæ occurring on the inner surface and the brush hairs form a triangular appendage at the tip.

---

[37] L. c., p. 59.

[38] L. c., p. 379.

On these characters the following division of the tribe could be made:

DIVISION I.

Hermaphrodite florets sterile, style entire, except in *Polymnia*, with a truncate appendage of brush hairs, or linear obtuse with brush hairs covering the whole surface. This division includes the genera: *Silphium*, *Polymnia*, *Berlandiera*, *Iva* and *Xanthium.*

DIVISION II.

Hermaphrodite flowers fertile, with a two-branched style. The branches have a triangular tip, the brush hairs cover the outer surface of the branch, and extend down a part or the entire distance to the base, occurring also on the inner surface at the very tip. The papillæ cover the entire inner face or occur in two very wide lines. This division includes the genera: *Helianthus*, *Tetragonotheca*, *Eclipta*, *Echinacea*, *Rudbeckia*, *Lepachys*, *Borrichia*, *Actinomeris*, *Coreopsis*, *Bidens*, *Baldwinia* and *Galinsoga.*

DIVISION I.

Silphium[39] (Plate CXIX, Fig. 1-5).

S. perfoliatum, L. Style of the hermaphrodite sterile flowers entire, cylindrical, obtuse. Brush hairs cover the entire surface for about three-fourths of its length (Fig. 4). They are large, broad at the base, and with an acute point (Fig. 5). Style branches of the pistillate flowers long and acute. Stigmatic papillæ cover the entire inner surface (Figs. 1, 2). The papillæ (Fig. 3) are short and obtuse.

Polymnia[40] (Fig. 6).

P. Canadensis, L. Sterile style is two cleft. The branches are entirely covered with brush hairs, which are very short and broad (Fig. 6).

Berlandiera (Fig. 7).

B. subcaulis, Nutt. The branches of the pistillate flowers are smaller than in *Silphium*, and the papillæ are in two wide lines along the edges of the branch. Papillæ are shaped similar to those of *Silphium* (Fig. 7).

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[39] Gray, l. c., p. 61. Hildebrand, l. c., p. 29.

[40] Gray, l. c., p. 60.

Iva (Fig. 8-10).

I. xanthiifolia, Nutt. The style of sterile hermaphrodite flowers is undivided, narrow at the base, and gradually enlarging to the tip. The brush hairs are in a truncate tuft at the tip of the style (Fig. 9). Brush hairs obtuse and not as long as in *Silphium* (Fig. 10). The branches of the pistillate style are short, acute, with the stigmatic papillæ in two lines along the edges. The papillæ (Fig. 8) are more acuminate than in *Silphium*.

Xanthium (Fig. 11-13).

X. echinatum, L. The style of the sterile hermaphrodite flower is nearly cylindrical, undivided, with brush hairs covering the entire surface for about one-fifth of the length of the style (Fig. 12). Brush hairs broadly obtuse (Fig. 13). Stigmatic papillæ are rather large and somewhat acute (Fig. 11).

DIVISION II.

Helianthus, (Plate CXIX, Fig. 27, 28).

H. rigidus, Desf. The branches have a triangular shaped tip with the brush hairs covering the entire outer face and the tip of the inner face. The stigmatic papillæ cover the entire inner face except the tip (Figs. 27, 28). The brush hairs are large and acuminate. In *H. tuberosus* the three cleft style was also found. In some of these three cleft styles it seemed as though the third branch was formed by the division of one of two original branches, but in most cases all three of the branches were of equal length and seemed to be wholly separate.

Heliopsis (Fig. 14, 15).

H. helianthoides (L.), B. S. P. The style is the same as in *Helianthus*. The brush hairs do not cover the entire outer surface, but only the outer tip. The papillæ cover the entire inner face, or are in two very wide lines, appearing as one wide line occupying the whole inner surface.

The stigmatic papillæ (Fig. 15) are larger than those of *Silphium*, while the brush hairs (Fig. 14) are smaller.

Tetragonotheca (Fig. 16, 17).

T. Ludoviciana (T. & G.), Gray. The branches of the style have a very slender tip. The brush hairs cover the outer face along the upper two-thirds of the branch. The longest hairs occur where the branches begin to taper. The papillæ are in two lines along the edges of the inner face and are of about average size (Fig. 17). The brush hairs (Fig. 16) are larger than those of any other genus studied.

Eclipta (Fig. 18).

E. alba (L.), Hassk. The style has the same general structure as in *Helianthus*, but it was so small that the exact form was hard to determine. The papillæ (fig. 18) are short and obtuse.

Echinacea (Fig. 19-20).

E. angustifolia, DC. Branches of the style long and tapering. The brush hairs occupy a little more than one-half of the branch, covering the outer face and the tip of the inner. The longest hairs occur just below the tip, (fig. 19). The papillæ cover the entire inner surface and are of average size, (fig. 20).

Rudbeckia (Fig. 21-22).

R. subtomentosa, Pursh. The branches are like those of *Helianthus* except they do not taper so much. The long and slender brush hairs cover the outer face of the branches for their whole length, (fig. 21). The papillæ, (fig. 22) cover the entire inner face.

Lepachys (Fig. 23-24).

L. pinnata (Vent.), Torr. & Gray. Style branches a little shorter than in *Helianthus*, very slender, tapering above the end of the stigmatic lines. Brush hairs cover not only the outer face for nearly its entire length, but also the inner face above the end of the stigmatic lines. As compared with *Rudbeckia* the hairs are short and broad, (fig. 23). The papillæ are in two lines on the inner face for about one-half the length of the branch. They are very short and obtuse, (fig. 24).

Borrichia (Fig. (25-26).

B. arborescens (L.), DC. The branches are slender and about one and a half times as long as in *Helianthus*. The brush hairs cover the tip of the inner face and the entire outer for about half of its length, (fig. 25). The large stigmatic papillæ cover the entire inner face, (fig. 26).

Actinomeris (Fig. 29-30).

A. alternifolia (L.), DC. Branches much the same as in *Helianthus.* The brush hairs, which are most abundant at the tip, cover the entire outer face nearly the entire length of the branch. They are broader and shorter than in most of the other genera, (fig. 29). The papillæ are in two very wide lines on the inner face and are quite small and narrow, (fig. 30).

Coreopsis (Fig. 31-35).

C. palmata, Nutt. The entire style is in general like *Helianthus* (fig. 31-35).

Galinsoga (Fig. 36).

G. parviflora, Cav. Branches of the style about one-fourth as long as *Helianthus.* Brush hairs cover the outer face for about two-thirds of its length, (fig. 36). Papillæ are in two broad lines on the inner face.

HELENOIDEÆ[41] (Plate CXIX. Fig. 37–42). ANTHEMIDEÆ[41] (Plate CXX. Fig. 1-8). SENECIONIDEÆ[41] (Plate CXX. Fig. 8-14).

These tribes will be considered together since the styles are much alike. In all three tribes the hermaphrodite perfect flowers have a two branched style with the brush hairs either (1) in a truncate bunch at the tip of the branch, or (2) covering the entire or part of the outer face of the branches and forming a slightly triangular tip.

In the three genera of Anthemideæ which I have examined, the truncate bunch of brush hairs is present, and the stigmatic papillæ are arranged in two lines along the edges of the inner face. In Helenioideæ two of the three genera examined had the truncate bunch of brush hairs as in Anthemideæ, the other genus having long and somewhat triangular tipped branches, with the brush hairs covering a part of the outer surface. In Senecionideæ one of the three genera examined has the truncate bunch of brush hairs, the two others have a triangular or an obtuse tipped branch with the brush hairs on the outer face? In these tribes, therefore, the style characters are not uniform. They are of two divisions, one of which might be mistaken for Helianthoideæ.

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[41] Gray, l. c. pp. 70, 77, 79. Bentham, l. c. pp. 381, 382, 384.

HELENIOIDEÆ, (Plate CXIX. Fig. 37-42).

DIVISION I.

The style branches of the hermaphrodite perfect flowers are short, with a distinct bunch of brush hairs at the tip. Papillæ arranged in two comparatively wide lines along the edges of the flattened branches. This division includes the genera *Helenium* and *Actinella.*

DIVISION II.

Branches of the style in the hermaphrodite perfect flowers are considerably longer than in division I, brush hairs distinctly not truncate forming only a slight enlargement. Brush hairs occupy the outer face for about one-third of its length. The papillæ are in two lines on the inner face. This division includes the genus *Dysodia.*

Helenium (Fig. 37-40).

H. antumnale, L. Style branches are essentially as described in division I. The brush hairs (fig. 39) are cylindrical, obtuse. The papillæ, (fig. 40) are short and obtuse.

Actinella (Fig. 41–42).

A. linearifolia (Hook.), Torr. & Gray. Style branches as in *Helenium*, only somewhat broader and shorter. Brush hairs as in Fig. 41, and stigmatic papillæ as in Fig. 42.

Dysodia (Fig. 43).

D. chrysanthemoides, Lag. Branches of the style as described for division II. Brush hairs shorter and broader than in *Helenium.*

ANTHEMIDEÆ (Plate CXX. Fig. 1-10).

In the *Anthemideæ* the three genera examined have a truncate bunch of brush hairs, as division I of *Helenioideæ*. The style branches are somewhat broader and shorter than in that tribe.

Achillea (Fig. 1-4).

A. Millefolium, L. The style branches the same as in the tribe (fig. 1-3). The brush hairs (fig. 4) are broad and short.

Matricaria (Fig. 5).

M. inodora, L. Branches of the style in the perfect hermaphrodite flowers are like those of *Achillea* but not so long, which applies also to the brush hairs and papillæ.

Artemisia (Fig. 6-10).

A. Ludoviciana, Nutt. Style branches of perfect hermaphrodite flowers same as in *Achillea* but shorter. Brush hairs (fig. 8) are longer and narrower. Papillæ (fig. 9-10) are a little larger. The style branches of the pistillate flower, acute with the papillæ in two lines along the edges, (fig. 6-7).

SENECIONIDEÆ (Plate CXX. Fig. 11-16).

Two kinds of styles occur in *Senecionideæ* corresponding to those of *Helenioideæ*. The first division with a truncate bunch of brush hairs as in *Senecio*. The second division with triangular or obtuse tips is represented by *Petasites* and *Arnica*.

Senecio (Fig. 11-12).

S. aureus, L. The style branches are as in division I of *Helenioideæ*. Brush hairs (fig. 11) are almost like those of *Artemisia*, but more acute. Papillæ shown at Fig. 12.

Petasites (Fig. 13-14).

P. palmata (Ait.), Gray. Branches of the style are very short compared with its length. The tips of the branches are somewhat triangular. Brush hairs cover the outer faces entirely, the longest ones being at the tip. Papillæ cover the entire inner surface except a small part at the tip (fig. 13). Brush hairs from the tip and base of branch (fig. 14).

Arnica (Fig. 15–16).

A. Chamissonis, Less. Branches of the style terete or nearly so, and obtusely tipped. Brush hairs (fig. 16) cover the outer face for about two-thirds of its length. They are longer and more numerous at the tip. The stigmatic papillæ (fig. 15) in two wide lines on the inner face with only a very narrow zone between them.

CYNAROIDEÆ (Plate CXX, fig. 17-21).

Branches of the style in the perfect hermaphrodite flowers are obtusely or slightly acutely pointed. The brush hairs cover the entire outer face as far down as the base of the branches and sometimes farther. The papillæ are in two lines or cover the entire inner face.

Cnicus (Fig. 17-18).

C. altissimus, var. *discolor* (Muhl.), Gray. The style branches are very long cylindrical with a slight acute tip. The brush hairs cover the entire outer face as far down as the base of the branches, ending just below the base of the branches in a tuft of somewhat longer hairs (Fig. 17). The papillæ are in two moderately wide lines on the inner face, and extend the whole length of the branch. The brush hairs (fig. 18) are rather short and acute.

Centaurea (Fig. 19-21).

C. Americana, Nutt. Branches of the style are very short and obtuse. Brush hairs cover the entire outer face of the branches, and extend below the forks for about one-third of the entire length of the style (fig. 19-20). The papillæ occupy the entire inner face of the branches. Brush hairs (fig. 21) are longer than in *Cnicus* and are acuminate.

CICHORIACEÆ (Plate CXX, fig. 22-23).

In this tribe only one genus was examined, viz:

Taraxacum (Fig. 22-23).

T. officinale, Weber. Branches of the style are moderately long and terete. Brush hairs cover the entire outer face, and edges and tip of the inner face of the branches. They extend below the fork for about the length of the branches, and cover the style completely. The style is slightly enlarged below the fork. The papillæ occupy the entire inner face not covered with brush hairs (fig. 23).

CONCLUSION.

From these observations I would say in conclusion that, while there is not enough uniformity in the characters of the style, within the various tribes, to absolutely separate the different tribes in all cases, yet in most cases there is uniformity enough to aid greatly in classification. As has been pointed out by Bentham and Gray, it is impossible to rely upon a single absolute character for the whole order.

In some of the tribes the characters are more constant and uniform than in others. In the tribes Vernoniaceæ, Eupatoriacæ and Asteroideæ, the characters of the style are very uniform and constant for each tribe, and therefore can be used with great advantage. In the tribe Asteroideæ, sufficient structural differences occur in the genera studied to make two divisions.

In the tribes Helianthoideæ and Cynaroideæ, the characters are sufficiently uniform and constant to be of great aid, though not as much as in Vernoniaceæ, Eupatoriaceæ and Asteroideæ.

In the Helenioideæ, Anthemideæ and Senecionideæ, there is less uniformity and constancy. The style structure is similar in all three tribes, and is of two general kinds. One is constant and distinct for the three tribes, but the other is not sufficiently distinct to prevent its being confused with Helianthoideæ, but it would hardly be mistaken for Vernoniaceæ, Asteroideæ, or Eupatoriaceæ. In these tribes, therefore, the style characters cannot be used as distinctive marks for each tribe, but for the three tribes considered collectively.

Another difficulty met with is in diœcious flowers of Inuloideæ and Helianthoideæ. In these tribes the characteristic arrangement of the brush hairs and stigmatic papillæ cannot be used as characters, since the flowers are either sterile or fertile and pistilate, and so do not possess both brush hairs and stigmatic papillæ. In the tribe Cichoriaceæ only one genus was studied, and so no conclusions can be drawn as to the constancy of the style characters.

So we find, that while the style characters like other characters are of great value in some cases, in others they fail, and must be used in connection with some other characters in order to establish tribes.

Finally, I desire to express my thanks to Prof. L. H. Pammel, for his supervision and direction of my work, and to Mr. W. Zmunt, for carefully retracing my drawings.

EXPLANATION OF PLATES.

Plate CXVII.

Figs. 1-5.—*Vernonia Arkansana*, DC. 1-3 style × 30; 4, portion of fig. 1 enlarged × 60; 5, brush hairs × 500.

Fig. 6.—Brush hairs of *Elephantophus Carolinianus*, Willd. × 500.

Figs. 7–11.—*Kuhnia eupatorioides*, L. 7–8, style × 30 ; 9, portion of fig. 7 enlarged × 60 ; 10, brush hairs × 500 ; 11, stigmatic papillæ × 500.

Figs. 12–14a.—*Mikania scandens*, (L.) Willd. 12, style × 30 ; 13, portion of style × 150 ; 14, brush hairs × 500 ; 14a, stigmatic papillæ × 500.

Figs. 15, 16.—*Eupatorium altissimum*, L. 15, brush hairs × 500 ; 16, stigmatic papillæ × 500.

Figs. 17, 18.—*Brickellia Wrightii*, Gray. 17, brush hairs × 500 ; 18, stigmatic papillæ × 500.

Figs. 19, 20.—*Liatris squarrosa*, (L.) Willd. 19, brush hairs × 500 ; 20, stigmatic papillæ × 500.

Figs. 21–23.—*Trilisia paniculata*, Cass. 21, 22, brush hairs × 500 ; 23, stigmatic papillæ × 500.

Plate CXVIII.

Figs. 1–3.—*Solidago Canadensis*, L. 1, style × 30 ; 2, portion of style × 60 ; 3, brush hairs and stigmatic papillæ × 500.

Figs. 4, 5.—*Grindelia squarrosa*, Dunal. 4, brush hairs × 500 ; 5, stigmatic papillæ × 500.

Figs. 6, 7.—*Heterotheca*. 6, brush hairs × 500 ; 7, stigmatic papillæ × 500.

Figs. 8, 9.—*Chrysopsis villosa*, Nutt. 8, brush hairs × 500 ; 9, stigmatic papillæ × 500.

Figs. 10, 11.—*Aplopappus racemosus*, Torr. 10, brush hairs × 500 ; 11, stigmatic papillæ × 500.

Figs. 12, 13.—*Bigelovia nudata*, (Michx.) DC. 12, brush hairs × 500 ; 13, stigmatic papillæ × 500.

Figs. 14, 15.—*Brachychæta cordata*, Torr. & Gray. 14, brush hairs × 500 ; 15, stigmatic papillæ × 500.

Figs. 16, 17.—*Bellis integrifolia*, Michx. 16, brush hairs × 500 ; 17, stigmatic papillæ × 500.

Figs. 18, 19.—*Townsendia eximia*, Gray. 18, brush hairs × 500 ; 19, stigmatic papillæ × 500.

Fig. 20.—Brush hairs, staminate flower of *Baccharis halimifolia*, L. × 500.

Figs. 21, 21a.—*Seriocarpus asteroides* (L.) B.S P. 21, stigmatic papillæ × 500 ; 21a, brush hairs × 500.

Figs. 22–28.—*Aster-Novæ Angliæ*, L. 22, style of hermaphrodite × 30 ; 23, portion of style × 60 ; 24, style of pistillate flower × 30 ; 25 portion of fig. 24 enlarged × 60 ; 26, stigmatic papillæ of pistillate flower × 500 ; 27, brush hairs of hermaphrodite flower × 500 ; 28, stigmatic papillæ × 500.

Figs. 29–33.—*Erigeron Philadelphicus*, L. 29, 30, style × 30 ; 31, portion of style × 60 ; 32, brush hairs × 500 ; 33, stigmatic papillæ × 500.

Figs. 34, 35.—*Aphanostephus ramosissimus*, DC. 34, brush hairs × 500 ; 35, stigmatic papillæ × 500.

Figs. 36, 37.—*Boltonia asteroides*, L'Her. 36, brush hairs × 500 ; 27, stigmatic papillæ × 500.

Fig. 38.—Style of staminate flower of *Baccharis halimifolia*, L. × 50.

Figs. 39, 40.—*Pluchea camphorata*, (L.) DC. 39, style × 30 ; 40, brush hairs × × 500.

Figs. 41–44.—*Antennaria plantaginifolia*, (L.) Hook. 41, style of staminate flower × 50 ; 42, brush hairs of same × 500 ; 43, style of pistillate flower × 60 ; 44, stigmatic papillæ of same × 500.

Plate CXIX.

Figs. 1–5.—*Silphium perfoliatum*, L. 1, style of pistillate flower × 30; 2, portion of style × 60; 3, stigmatic papillæ × 500; 4, portion of style of hermaphrodite flower × 30; 5, brush hairs × 500.

Fig. 6.—Brush hairs of sterile flower of *Polymnia Canadensis*, L.

Fig. 7.—Stigmatic papillæ of pistillate flower of *Berlandiera subcaulis.*

Figs. 8–10.—*Iva xanthifolia*, Nutt. 8, stigmatic papillæ of pistillate flower × 500; 9, style of sterile hermaphrodite flower × 50; 10, brush hairs × 500.

Figs 11-13—*Xanthium echinatum*, L. 11, Stigmatic papillæ of pistillate flower × 500; 12, style of sterile flowers × 50; 13, brush hairs × 500.

Figs 14, 15—*Heliopsis helianthoides*, (L.) B. S. P. 14, brush hairs × 500; 15. stigmatic papillæ × 500.

Figs. 16, 17.—*Tetragonotheca Ludoviciana*, (T. & G.) Gray. 16, brush hairs × 600; 17, Stigmatic papillæ × 500.

Fig. 18.—Stigmatic papillæ of *Eclipta alba*, (L.) Hassk. × 500.

Figs 19, 20.—*Echinacea angustifolia*, DC. 19, brush hairs × 500; 20, stigmatic papillæ × 500.

Figs 21, 22—*Rudbeckia subtomentosa*, Pursh. 21, brush hairs × 500; 22, stigmatic papillæ × 500.

Figs. 23, 24—*Lepachys pinnata*, (Vent.) Torr. & Gray. 23, brush hairs × 500. 24, stigmatic papillæ × 500.

Figs 25, 26—*Borrichia arborescens*, (L.) DC. 25, brush hairs × 500; 26, stigmatic papillæ × 500.

Figs. 27, 28—*Helianthus rigidus*, Desf. 27, style of *Helianthus rigidus* × 30; 28, portion of style × 60.

Figs. 29, 30.—*Actinomeris alternifolius*, (L.) D.C. 29, brush hairs × 500; 30, stigmatic papillæ × 500.

Figs. 31-35.—*Coreopsis palmata*, Nutt. 31, 32, style ×30; 33, portion of style × 60; 34, brush hairs × 500; 35, stigmatic papillæ × 500.

Fig. 36.—Brush hairs of *Galinsoga parviflora*, Cav. × 500.

Figs. 37-40.—*Helenium autumnale*, L. 37, style × 30; 38, portion of style × 60; 39, brush hairs × 500; 40, stigmatic papillæ × 500.

Figs. 41, 42.—*Actinella linearifolia* (Hook), Torr. & Gray. 41, brush hairs × 500; 42, stigmatic papillæ × 500.

Fig. 43.—Brush hairs of *Dysodia chrysanthemoides*, Lag. × 500.

Plate CXX.

Figs. 1-4–*Achillea Millefolium*, L. 1, style × 30; 2, style × 50; 3, stigmatic papillæ × 500; 4, brush hairs × 500.

Fig. 5.—Brush hairs of *Matricaria inodora*, L × 500.

Figs. 6-10.—*Artemisia Ludoviciana*, Nutt. 6, style of pistillate flower × 30; 7, stigmatic papillæ of same × 500; 8, brush hairs of perfect flower × 500; 9, 10, stigmatic papillæ of same × 500.

Figs 11, 12.—*Senecio aureus*, L. 11, brush hairs × 500; 12, stigmatic papillæ × 500.

Figs 13, 14—*Petasites palmata*, (Ait) Gray. 13, stigmatic papillæ × 500; 14, brush hairs × 500.

Figs. 15, 16.—*Arnica Chamissonis*, Less. 15, style × 30; 16, brush hairs × 500.

Figs. 17, 18.—*Cnicus altissimus*, var. *discolor*, (Muhl.) Gray; 17, style × 30; 18, brush hairs × 500.

Figs. 19-21.—*Centaurea Americana*, Nutt. 19, 20, style × 30; 21, brush hairs × 500.

Figs. 22, 23.—*Taraxacum officinale*, Weber. 22, style × 30; 23, brush hairs × 500.

On the Evolution of Parasitic Plants.

When we observe the complete parasitism of *Phoradendron*, *Arceuthobium* and *Conopholis*, it is difficult to conceive that time was when they grew wholly in the ground. It is not necessary to use the expression, now common, that their ancestors were terrestrial. There seems no reason why these plants, as now existing, may not in the past have grown wholly in the ground.

When we consider the immense number of parasitic Loranths, and the close relation of that order to Santalaceous plants, we might assume some considerable evolution in order to bring the former to the parasitic condition, but for the fact that we find members of the latter family partially parasitic In 1853 Mr. Jacob Stauffer of Lancaster, Pa., published a paper with drawings of a parasitic *Comandra umbellata*. Carefully washing out roots I could find no such attachment, but have since been rewarded by a beautiful case. The *Comandra* was obtaining most of its support from an attachment to a large root of *Vaccinium stamineum*. A case with an English ally of *Comandra*, *Thesium linifolium*, is noted in Bromfield's Flora Vectensis, and approvingly referred to in the third edition of Gray's Text Book. What is there to prevent that which is occasional from becoming habitual and permanent?

Partial parasitism is observed in many families. Mr. Stauffer, in the paper cited, illustrates *Gerardia quercifolia* and *Gerardia flava* in a similar condition, but I have never been able to find a case. This has also been reported of *Castilleia*. I exhibited at the Boston meeting of the American Association for the Advancement of Science carefully prepared colored drawings by Lunzer of *C. coccinea* showing its partial parasitism on the roots of grasses. So far as these instances are concerned it is clear that a plant may easily assume the habit of attachment without any serious modification of structure. We want only some illustrations of seeds usually germinating in earth, sprouting and penetrating the bark from birth.

Passing from the chlorophyllous to the aphyllous parasites, I can vouch for the germination of seeds of *Aphyllon fasciculatum* directly on the stems of Geraniums when planted as cuttings beneath the soil; and carefully washing out the earth from *Aster corymbosus* in a locality where *A. uniflorum* is abundant, have seen the young plants starting from its fibres. *Epiphegus* I have also found in the earlier stages of growth attached to beech roots. On the other hand plants, which are scarcely parasites, have seed sprouting on bark to which the plant subsequently becomes attached. It is not always the decaying bark which receives the sprouting seed of the epiphyte. *Tillandsia usneoides* sprouts on the clear, glossy green bark of the orange tree. This may also be a partial parasite, though no direct penetration of the parts has been discovered. Dr. Chalkley Palmer analyzed the ashes, finding silica, iron, alumina, manganese, lime, magnesia, potash, soda, sulphur, chlorine, carbon and phosphorus. It is inconceivable that the Spanish moss should derive all these from the atmosphere.

I am convinced that a large number of root parasites require nothing but the ordinary earth to sprout their seeds in, and that many will live through their whole individual existence with nothing more in the soil than ordinary soil affords. My companion, in 1873, in Rocky Mountain exploration, Mr. Josiah Hoopes, found *Castilleia* seeds that grow as do any ordinary seed; and Mr. Isaac C. Martindale has recorded in the Botanical Gazette and Mr. Brown in the BULLETIN OF THE TORREY CLUB that *Orobanche* will germinate in ordinary garden earth, and go on with its development through all its stages as a well behaved member of the vegetable kingdom ought to do. I have shown in a recent issue of the Botanical Gazette that *Sarcodes sanguinea* has the same character. I have found *Monotropa* in soil with the slightest modicum of vegetable matter as often as actually among decaying leaves. Mrs. Harker, of Mount Holyoke Seminary in 1888, found *Cuscuta* germinating in the earth, which after finding something to fasten its fangs into, by the twisting of its stem, drew its roots out of the ground to die. It would be interesting to watch and prevent parasitism, and then see how a *Cuscuta* would behave. *Corallorhiza* at the time of flowering has a large mass of coral-like tissue at the base. Transplanting these I find the plants live and flower several years. *Sarcodes sanguinea* with a similar and larger mass has not grown the second year for me.

It is clear that there is a varying power of adaptation in parasitic plants much greater than is generally supposed, affording a fine field for the student in evolution. I read a paper on this subject at the Boston meeting above cited ; but, annoyed at the mysterious disappearance from the President's desk of my carefully prepared drawings, I did not publish it. But with some recent interest manifested the above facts may be worth recording.

THOMAS MEEHAN.

GERMANTOWN, PA.

The Giant Sundew Heliotropic.

The *Drosera* of all American *Droseras* is the *D. filiformis*, and its abundance in the low ground at this time of the year is particularly striking. The round leaved species (*Drosera rotundifolia*) covers the otherwise bare white moist sand in many places and sends up its slender scapes bearing the small, erect, pale pink blossoms, while in the more grassy areas associated with the common pale yellow leaved pitcher plant (*Sarracenia flava*), the *Drosera filiformis*, thrives in all its attractiveness. At a distance of a few rods the blooms of this sundew might be mistaken for the rich orchid, *Calopogon tuberosus*, as the flower, fully an inch across, has the same beautiful bright purple color. The smooth erect scape is about a foot and a half high, therefore exceeding somewhat the extremely viscid filiform leaves which unroll from the top as they unfold. After a few days the old leaves have secured many small insects, and their neatness and peculiar beauty in the morning sun are somewhat impaired thereby.

But it is with the behavior of the blossoms that this note has particularly to do. Aside from the scape being many-flowered and the raceme hanging down like the bend of a shepherd's crook, it may be said that this curve straightens out fast enough, so that a new flower is brought out each day to the top of the bend, when it displays its rich colored corolla and showy yellow anthers. Most interesting of all is the fact that the blossom invariably faces the morning sun; at least in counting a hundred or more to-day there was not a single exception save in one case, and that was caught in the " hook " of its neighbor and faced northeast instead of east. Our giant sundew, among its many attractions is therefore prominently heliotropic so far as its beautiful purple blossoms are concerned.

BYRON D. HALSTED.

OCEAN SPRINGS, MISS., May 11, 1891.

Flora of Richmond Co., N. Y.--Additions and New Localities, 1890.

APPENDIX NO. 6.

Ranunculus Ficaria, L. Willow Brook. Scarce.

Ranunculus lacustris, Beck & Tracy. (*Ranunculus multifidus*, Pursh). In a single pond hole, Ocean Terrace.

Ranunculus septentrionalis, Poir., replaces *R. fascicularis* of our Catalogue.

Hesperis matronalis, L. Annadale.

Lechea racemulosa, Lam., listed as occurring at Tottenville, proves to be an error in determination.

V. blanda, Willd. var. *amœna*, (Le Conte), B.S.P. Clove Valley.

Hypericum Canadense, L. *var. majus*, Gray. Garretsons. (Mrs. N. L. Britton).

Tilia Americana, L. Near Richmond. (Wm. T. Davis).

Nemopanthes mucronata, (L.), Trel. Giffords. (Wm. T. Davis).

Euonymus Europæus, L. Tottenville.

Fragaria Indica, Andr. Garretsons. (Miss Timmerman).

Eupatorium hyssopifolium, L. Pleasant Plains.

Eupatorium perfoliatum, L., var. *truncatum*, Gray. Oakwood.

Aster Radula, Ait. Mariners Harbor. (R. G. Eccles).

Aster vimineus, Lam. Garretsons.

Erigeron ramosus (Walt.), B.S.P., var. *discoideus* (Robbins) B.S.P. New Dorp.

Hieracium aurantiacum, L. Rossville.

Lactuca Canadensis, L. A peculiar form with linear, entire leaves. New Dorp.

Oxycoccus macrocarpus, Pers. Annadale. (Wm. T. Davis).

Veronica Chamædrys, L. Princes Bay. (Mrs. N. L. Britton).

Plantago major, L., var. *minima* (DC.), Decne. Richmond Valley.

Alnus glutinosa, Willd. Todt Hill.

Salix purpurea, L. Rossville.

Populus heterophylla, L. Near Green Ridge. (Wm. T. Davis).

Microstylis unifolia (Michx.), B.S.P. Ocean Terrace. (Miss C. A. Timmerman). Abundant near Egbertville.

Liparis Loeselii, (L.) Rich. Garretsons. (Miss C. A. Timmerman).

Habenaria blephariglottis (Willd.), Torr. Mariners' Harbor. (R. G. Eccles).

Habenaria ciliaris, (L.) R. Br. Old Place. (Wm. T. Davis.) Arlington. (Dr. R. G. Eccles.) Bogardus Corners.

Belamcanda Chinensis (L.), Red. Tottenville.

Tradescantia Virginica, L. Bogardus Corners.

Lemna trisulca, L. Clove Valley. (Thos. Craig).

Eleocharis palustris (L.), R. Br. var. *glaucescens* (Willd.) Gray. Common.

Scirpus Olneyi, Gray. New Dorp.

Panicum miliaceum, L. Todt Hill.

Glyceria distans (L.), Wahl. New Dorp.

ARTHUR HOLLICK.
N. L. BRITTON.

Notes on Fungi affecting Leaves of Sarracenia purpurea in Minnesota.

Sarracenia purpurea is found abundantly in tamarack swamps and river-bottom morasses in the vicinity of Minneapolis. Almost all plants in certain tamarack swamps are affected with *Sphærella Sarracenia*, (Schw.), Sacc., and this is the most common parasite on the living leaves. It produces circular, confluent blood-red or crimson spots, generally appearing first near the mouth of the "pitcher," and gradually covering the whole leaf. Associated with this, *Leptosphæria scapophila*, (Peck), Sacc., is not uncommon, and has been collected also on plants growing in open morasses. *Pezisa abrata*, mentioned in Farlow and Seymour's "Host-Index," 1888, as occurring on *S.*

purpurea, must be very rare in the vicinity of lakes, as no specimens have been seen.

In addition to these plants already indexed, *Pestalozzia aquatica*, E. E., Journal of Mycology, V. 157, perhaps occurs on Minnesota *Sarracenia*. Some doubtful references to this species have been made.

Two hyphomyetous imperfect forms, apparently undescribed, are abundant in some open morasses upon Minnesota *S. purpurea*. A description of these is ventured.

{ *Helminthosporium Sarraceniæ*, n. s.
{ *Brachysporium Sarraceniæ*, n. s.

The names are bracketed because there seems to be doubt whether both should not be referred to the same plant. Both *Brachysporium* and *Helminthosporium* conidia were noted in the same tufts, and it was found impossible to separate the two upon purely vegetative characters.

HELMINTHOSPORIUM SARRACENIÆ, n. s.

On dead leaves of *Sarracenia purpurea* : forms circular, black, velvety, somewhat confluent spots over whole affected leaf. Fertile hyphæ erect, fasciculate, swollen nodally 75 : 150=3.5 : 7.5μ. brown, muleate. Conidia continuous to 4—septate, smooth, long-ovoid 7 : 15=3 : 8.μ.

BRACHYSPORIUM SARRACENIÆ.

On dead leaves of *S. purpurea*. Vegetative characters all as in *Helminthosporium Sarraceniæ*. Conidia, almost spherical, generally devoid of pedicels, pluriseptate, of from eight to twelve cells, dark fuscous or carbonaceous, echinulate 15 : 30=15 : 30μ.

Under the artificial classification at present, perforce, adopted by mythologists, it was thought best to describe this plant under both form genera. The writer is of the opinion that only one plant is really in question.

Specimens from which descriptions were made, were collected by Mr. E. P. Sheldon, in Ramsey Co., Minn.

CONWAY MACMILLAN.

Botanical Notes.

The herbarium of the late Dr. C. C. Parry, has recently been carefully arranged and catalogued, and the list is now in press.

The collection is particularly rich in western and southern plants, and would make a very valuable addition to an eastern herbarium which lacks those plants. It is now offered for sale by Mrs. Parry, and copies of the list will be sent, (when issued), on application to Mrs. E. R. Parry, Davenport, Iowa.

Nyssa Sinensis is a new species of Tupelo described by Prof. D. Oliver in Hooker's Icones Plantarum, Plate 1964. The genus was formerly supposed to be confined to eastern North America, but has been found in the Himalayas, and this last species was collected by Dr. A. Henry in China. It is a small tree, about 20 feet high with ovate lanceolate, acuminate leaves, and pedicelled ovaries.

A Monument to Linnæus. The Chicago Herald of May 22d, contains an account and representation of the monument to Linnæus, presented to the City of Chicago by the Swedish Linnæan Monument Association. The figure of the great botanist is of bronze, upon a granite pedestal and when completed will have four allegorical figures at the base, representing four of the sciences in which he was distinguished.

Hepaticæ Americanæ, L. M. Underwood and O. F. Cook. We have recently received numbers 80-100, including recent collections in Florida by Prof. Underwood, in Mexico by Pringle, Macoun's British Columbia, Leiberg's Idaho, and New England specimens from A. W. Evans in the following genera: *Anthoceros*, *Asterella*, *Chiloseyphus*, *Frullania*, *Jubula*, *Jungermania*, *Lejeunia*, *Lepidozia*, *Lophocolea*, *Marsupella*, *Nardia*, *Plagiochila*, *Porella*, and *Radula*. E. G. B.

Potamogeton Javanicus, Hassk. and its Synonymy. Dr. Hans Schinz (Bull. Soc. Bot. Suisse i., 52-61). Dr. Schinz shows that the plant hitherto known as *P. tenuicaulis*, F. Von Müller, and *P. pavifolia*, Buch., and sometimes erroneously regarded as synonymous with our North American *P. hybridus*, Mx., from North Australia, Formosa, Japan and Korea, should bear the older name *P. Javanicus*, Hassk. T. M.

Reviews of Foreign Literature.

Contribution a l'Histoire Naturelle de la Truffe. A. Chatin. (Bull. Soc. Bot., France, xxxviii. 54-64).

Four species of Truffles are described; *Tuber nucinatum*, *T. heimalbum*, *T. brumale*, and *T. montanum*. They are associated all through France with *Tuber melanosporum* or *T. cibarium*, the "Truffe du Périgord" of the markets, and are often confounded with it, and, when possible, sold as such. In Algeria, Tunis and Morocco, a species of Truffle is known as *Terfâs*, and is the Mizy, or Mison, that in the days of Pliny the Romans obtained from Carthage and Lybia. It is the *Tuber niveum* of Desfontaines, the *Chœromyces*, and later, the *Terfezia Leonis* of of Tulasne Three species of African and Arabian *Terfâs* are described as *Terfezia Leonis*, Tulasne, *T. Boudieri* and *T. Boudieri*, var. *Arabica*, and a fourth is given a new generic as well as specific name, *Tirmannia Africana*. They are gathered in great quantities, and for many months are one of the most important of the caravan supplies. A. M. V.

Ueber Schutzmittel des Laubes gegen Transpiration, besonderes in der Flora Javas. A. F. W. Schimper: (Sitzungsberichte der Berl. Akadem. der Wissenschaften, 1890, S. 1045.)

Protective characters against a too rapid transpiration have, up to the present time, except in one or two cases caused by climatic changes, been recognized as found only in plants inhabiting deserts or extremely dry localities. (Xerophytes).

The observations communicated in the present paper (later to be enlarged and illustrated) have led to the remarkable conclusion that dryness of habitat is by no means the only influencing factor which may be active in causing the development of protective characters against transpiration.

Such characters are found quite universal in sea-shore (Halophytes) and alpine plants, and in temperate zones in all woody evergreens.

The sea-shore and alpine plants the author has recently throughly studied in Java, with the results communicated in the following paper.

I.—Sea-shore plants: (Strandpflanzen, Halophytes).

It is already well known that concentrated solutions of common salt exercise a retarding influence on transpiration, and that these regarding influences, beginning with 0.5, increase as the concentration increases.

Pfeffer* explaines this by saying that a concentrated salt solution has the same effect on the plant as a relatively dry soil would have, i.e. makes it very difficult for the plant to procure its necessary water. Experiments conducted by the author show that a concentrated solution of sodium chloride almost wholly destroys the assimilation of starch or glucose, so that neither are formed to any extent in the plant.

Germinating seedlings of corn were cultivated in a normal culture solution, both with and without a 0.5 (Proc.) solution of common salt. The first remained for three months, during the time of the experiment, without change and perfectly healthy ; the second in a similar solution but without salt, in the same time grew to very large dimensions. The plants cultivated with the salt solution contained neither starch nor glucose, while the other set of plants had their tissues filled with both. Plants cultivated in solutions with less salt give similar results, but less pronounced. Like results were obtained with a series of different plants, and the author deduces the following conclusion with respect to all halophytes, which invariably possess some kind of protective characters, just as desert plants do, to ensure them against a too rapid transpiration, and for the following reasons:

1. On account of the very greatly increased difficulty for such plants to obtain their water supply, while growing in salt water or a soil saturated by the same.
2. Because concentrated salt solutions in the plant cells wholly check the assimilative activity.
3. Because still more concentrated solutions cause the death of the plant.

In Java the sea-shore plants, or strand plants, may be readily divided into four groups:

1. The Mangrove-formation, covering the area of flood tide.
2. The Nipa-formation, distinguished through the presence of immense numbers of *Nipa fruticosa*, a small stemless palm which replaces the Mangrove in places where the water is less salt.
3. The Katappa-formation, growing just outside the reach of the

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*Pfeffer, Pflanzenphysiologie I. S. 151.

flood tide on the strand, characterized by the growth of *Terminalia Katappa*, *Casuarina equisetiformis*, *Cycas circinalis*, *Pandanus.*

4. The Pescapræ-formation, named after *Ipomœa pescapræ*, which closes down on the strand vegetation from behind, together with occasional trees and shrubs, creeping vines and low plants of various kinds from different families of Gramineæ, Leguminosæ and Convolvulaceæ, growing in the sand, characterizing this zone.

Notwithstanding the fact that all these plants, except those in the Pascapræ formation, take their root in a constantly wet substratum, yet they are emphatically xerophyllous in their character. This peculiarity finds expression in the thick, fleshy leaves, in the reduction of the transpiring surface, in the hairy covering, and in the vertical position of many leaves.

The anatomical structure shows it still plainer in the thick walls, strongly cuticularized outer cell coverings, deeply sunken stomata and fully developed water system.

In Buitenzorg, where plants from the strand had been cultivated back in common soil, away from the direct influences of the sea, these modified characters have been largely lost. The leaves from *Soneratia acida*, a mangrove, are no longer insolatral, but bifacial, much thinner than in the mangrove. The stomata are no longer sunken, the epidermis has thiner walls and the cuticula is also thinner.

II.—The Alpine Flora of Java.

Java is noted for its volcanoes, often united into small mountain chains. On some of these volcanoes the ground has been well cultivated to a height of from four to five thousand feet. Higher up are large tracts of forest. Still higher we come to the lower line of the foggy region, where rain falls daily. In this moist region we have every where a reduction in the stem and root growth of trees and plants in general, and a great increase in the leaf-surface. The trees are slim and loosely branched. Epiphytes abound on all the branches. Passing through the foggy region, which does not extend to the top of the mountain, one loses the hygrophyllous character of the vegetation, and comes at once into an outspoken xerophyllous zone. Here the characters, as expressed in the foggy region, are reversed. The trees become low and massive, the formation of wood is greatly emphasized, the leaves are thicker and much lessened in numbers, the root system is diminished and the branches become knotty and irregular, as is often seen in the Alps. Different kinds of Rhododendrons and Agapetes, which lower down grew only on trees, as epiphytes, change their habit and are found growing on the ground in great numbers Mosses and Lichens are covering the scraggy trees. As one goes still higher the trees lessen into low matted bushes, which cover the highest points of the mountain peaks. This last formation on the summit, which may be compared with the alpine savannas, and is about 8,000 feet high, differs much more from the lower zones of vegetation on the same mountain, than these alpine savannas do from the lower wooded regions of the Alps, although on the highest points of the mountains of Java snow is unknown and the temperature is for the whole year favorable to plant developemnt.

The peculiarity of the alpine flora is not due to the low temperature to which it is exposed, but to protective characters, developed in order to shield it against a too rapid transpiration. The habit of species from widely separated families is here the same.

The xerophyllous character of the alpine flora of Java finds its expression not alone in physiological characteristics, or in the presence of Australian forms (*Leucopogon*, *Coprosoma*,) or in the lack of Phanerogams and other common characters, but in the most striking microscopic changes in the anatomy of the parts, all looking toward the conservation of moisture.

Plants with such characters generally lose them when cultivated for a time lower down in the valleys.

The peculiarities of our alpine flora, such as the gnarly growths, thickening of leaves, tomentose coverings, &c., have up to the present time been considered as adaptations to the low winter temperature, and the pressure of the snow. These characters are found, however, on the mountains of Java, in a nearly constant summer temperature. I do not hesitate to say that these conditions, both in the Alps and in Java are referable to one and the same cause, i.e.: the greater transpiration caused by less dense atmosphere and increased insolation, these conditions rendering it more difficult for the plant to provide itself with the necessary amount of water under such increased conditions of transpiration.

III.—Interchange of habitat between the Halophytes, Epiphytes and Alpine growths.

The resemblances existing between some of the strand plants and those of the alpine regions has already claimed some attention. In Java this analogy may be easily observed. Between some of the strand trees and those of the high elevations there is great resemblance in the stunted and distorted appearance of each. *Dodonæa viscosa*, a common strand plant, appears suddenly at an elevation of 6,000 feet.

On some of the volcanoes within the region of fogs are found fumaroles. Around these the vegetation is entirely changed, becoming strongly xerophyllous. The Epiphytes, generally on trees in this belt, in the vicinity of the fumaroles, descend to the ground. Alpine plants are common here which usually occur at an elevation of 8,000 ft.

IV.—The Evergreen Woody Plants in Temperate Zones.

Many trees in the tropics drop their leaves at the beginning of the dry season. The leaf-fall in autumn in temperate zones the author also looks upon as protective in its character. Such trees could not make good the water lost on warm days in winter while the roots were frozen.

The fall of leaves both in warm and in tropical climates seems to depend more upon the dry period of such climates than on the change of temperature. Thus on such trees as *Pyrus communis*, *Pyrus Malus*, *Liriodendron Tulipifera*, and many others which drop their leaves normaly in the autumn the following observations were made. In the garden at Tjibodas, Java, where the climate changes but little in moisture or temperature throughout the entire year, the author observed on Dec. 13th, 1889, branches on any of these trees representing any or all seasons of the year, a definite time for leaf-fall having been entirely lost.

All our Evergreen trees are provided with some means of protection. This is especially true of the Pine family, the leaves of which are well provided with thick cuticula and sunken stomata.

All these modifications are looked upon as protective by the author, against a too rapid transpiration, and not against cold.

W. P. WILSON.

Index to Recent Literature Relating to American Botany.

Apical Growth of Liverworts.—Notes on the. D. M. Mottier. (Bot. Gaz., xvi. 141-143, pl. xii).

The following species are figured as examples: *Marchantia polymorpha*, *Asterella hemisphærica*, *Conocephalus conicus*, *Anthoceros lævis and Onoclea Struthiopteris.*

Botany of Jackson Co. [Mo.]—Report on the. B. F. Bush. (Thirty-first Ann. Rept. State Hort. Soc., Mo., 370–372).

This is a supplementary list to those previously published, and raises the number of uncultivated species known in the county to 1,004. The author should not designate it a list of plants "native" to the county, however, as a large number of the species are the usual naturalized foreigners. The large number of typographical errors shows evidence of very careless proofreading.

Bromeliaceæ Schimperianæ. L. Wittmack. (Beiblatt, Engl. Bot. Jahrb. No. 29, 1-7).

A list of twenty-two species collected by Dr. W. Schimper in southern Brazil. *Bilbergia Schimperiana* and *Æchmea gamosepala* are described as new.

California Trees and Flowers. C. R. Orcutt. (West Am. Scientist, vii. 93–99; 123–133; 144–152; illustrated).

An alphabetical list designed to give brief descriptions of species which have been introduced into cultivation, or considered worthy of it. The list begins with *Abies bracteata* and ends with *Zygadenus Fremonti.*

Coca and its Therapeutic Application. Angelo Mariani. (Pamph. pp. 88, illustrated. New York, J. N. Jaros).

An interesting and freely illustrated account of *Erythroxylon Coca*, Lam., and the application of its leaves in medical treatment.

Continuity of the Protoplasm in the Chantransia Form of Batrachospermum. B. M. Davis. (Bot. Gaz., xvi. 149, with figure).

Enumeratio Plantarum Guatemalensium, Pars II. John Donnell Smith. (8vo, pp. 99, Oquawka, 1891).

This is a further enumeration of plants collected in Guatemala by Capt. John Donnell Smith and Baron H. de Tuerckheim, together with an appendix containing revisions of some of the former determinations. The numbers of these collections now run to something over 2450. The new species have been published in recent papers in the *Botanical Gazette*. This investigation of the Guatemalan flora is one of the most important of recent contributions to American Botany.

Epidendrum Sceptrum. (Bot. Mag., T. 7169).

Furcræa Bedinghausii. (Bot. Mag., T. 7170).

Ilex lævigata. (Gard. & For., iv. 220, 221; f. 39).

Immigrant Plants in Los Angeles County, California. A. Davidson. (West Am. Sci. vii. 138-140).

The following are mentioned: *Capsella bursa-pastoris, Erodium cicutarium, E. moschatum, Melilotus parviflora, Lolium perenne, L. temulentum, Dactylis glomerata, Phleum pratense, Festuca myurus, Phalaris Canariensis, Poa annua, Eragrostis poæoides, Panicum crus-galli, Bromus racemosus, Medicago sativa, M. denticulata, M. lupulina, Trifolium arvense, Brassica nigra, B. campestris, Mentha piperita, Marrubium vulgare, Nasturtium officinale, Malva borealis, Convolvulus arvensis, Silene Gallica, Stellaria media, Cerastium triviale, Anthemis Cotula, Silybum Marianum, Centaurea meletensis, Sonchus oleracea, S. asper, Taraxacum officinale, Vicia sativa, Dipsacus fullonum, Polygonum aviculare, Chenopodium album, Plantago major, P. lanceolata, and Urtica urens.*

Kritische Bemerkungen ueber die Geschichte der Vegetation Grœnlands. A. G. Nathorst. (Engler's Bot. Jahrb., xiv. 183-219, one map).

Leucocrinum montanum. Alice Eastwood. (West Am. Sci. vii. 141).

Lichenum Generis Cyrtidulæ Species nondum Descriptæ aut non vite Delineatæ. Arthur Minks. (Rev. Mycol., xiii. 55-65).

The following American species are noted: *Cytidula fusco-rubella*, Minks, n. sp., on *Acer rubrum*, New Bedford, Mass. (Willey); *C. limbata*, Minks, n. sp., on *Sassafras*, same locality and same collector; *C. Idæica*, Minks, n. sp. on *Sambucus Canadensis*, same place and collector, also found on *Rubus Idæus* in Germany; *C. microspora*, Minks, n. sp., also collected by Mr.

Willey at New Bedford, on *Clethra alnifolia* and *Ilex verticillata* and also occurring in Germany.

Malpighiaceæ Novæ. F. Niedenzu. (Biebl. Engler's Bot. Jahrb. xiv. No. 30, 1-7; one plate).

Descriptions of new species in the genera *Mascagnia*, *Hiræa*, *Mezia*, *Gaudichaudia*, *Stigmatophyllon*, *Pilochæta*, and *Thryallis*, all from South and Central America.

Melocacti novi ex Iusulis Archipelagi Indici Occidentali Neerlandicis, Curacoa, Aruba et Bonaire. W. F. R. Suringar. (Verslag. Akad. Vetensch. Amsterdam, Reeks 3, Deel 2, 183-195).

Method of Studying the Growth of Tubers.—A. Conway MacMillan. (Bot. Gaz., xvi. 149, 150).

Mission Scientifique du Cap Horn, 1882-1883, Lichens. J. Mueller. (4to, pp. 32, Paris, Gauthier Villars, 1888. See Bull. Soc. Bot. France, xxxvi. 60).

Missouri Botanic Garden.—Notes from the. (Gard. and For., iv. 225).

Monstrous Form of a Field Daisy.—A. B. W. Barton. (Bot. Gaz., xvi. 150, 151).

Naturalized Plants of Southern California.—Notes on the. S. B. Parish. (Zoe, i. 7-10; 56-59; 122-126; 182-188; 205-210; 261-265; 301-304; and ii. 26-34; also reprinted).

The author notes seventy-eight species, and the copious memoranda accompanying them are of great interest. In future years we have no doubt that many of these will appear rather curious reading, if some of the species mentioned spread as rapidly as they have done in the East. Thus in regard to *Daucus Carota*, we are told that two or three dozen were seen in a meadow at St. Elmo, and that this is their first recorded appearance in California.

New Grasses. Geo. Vasey. (Bot. Gaz.. xvi. 145-147).

Orcuttia Greenei, *Eragrostis spicata*, *Muhlenbergia Alamosæ*, *Calamagrostis densus*, and *C. kœleroides*, are described as new.

North Carolina Agricultural Experiment Station, Bulletin No. 76. (Pamph., 8vo, pp. 20, illustrated. Raleigh, N. C., 1891).

Under the head of "Plant Diseases and How to Combat

Them," are descriptions of *Læstadia Bidwelli*, *Perenospora viticola*, *Sphaceloma Ampelinum*, *Plowrightia morbosa*, *Monilia fructigena*, *Fusicladium dendriticum*, *Entomosporium maculatum*, *Phytopthora infestans*, *Puccinia graminis*, *Claviceps purpurea*, *Tilletia fœtens*, *Ustilago segetum*, and *U. Maydis*, the last three figured.

Notes from Columbus, Ohio. Aug. D. Selby. (Bot. Gaz. xvi. 148, 149).

The following western species are supposed to have been introduced from the cars or wagons of a traveling circus: *Erodium cicutarium*. *Aster pauciflorus*, *Amphyachyris dracunculoides*, *Dysodia chrysanthemoides*, *Gutierrezia Texana*, *Helenium nudiflorum*, *H. tenuifolium*, *Parthenium Hysterophorus*, *Solanum rostratum*, *Monarda citriodora*, and *Croton capitatum*.

Notes on the Flora of the St. Croix Region. E. J. Hill. (Bot. Gaz. xvi. 108-113; 126-130).

Notes on the Distribution of Some Kansas Trees. S. C. Mason. (Gard. and For. iv. 182, 183; fig. 34).

Notes on the Cottonwood, (*Populus monilifera*).

Peat Bogs in New Brunswick.—On Raised. G. F. Ganong. (Bot. Gaz. xvi. 123-126).

Pitcairnia Roezlii. J. G. Baker. (Bot. Mag. T. 7175).

Quinoa. H. H. Rusby. (Reprint from Bull. Pharm., Mch. 1891, illustrated).

Chenopodium Quinoa is here described, mostly from the economic importance of its seed as an article of food in South America.

Report.—Department of Vegetable Physiology, J. E. Humphrey. (Eighth Ann. Rept. Mass. Agri. Exp. Sta. 200-226, Pl. i, ii).

Contains notes upon several fungus pests, with illustrations of *Plowrightia morbosa*, *Plasmopara Cubensis*, *P. Australis*, *Monilia fructigena*, and *Pythium de Baryanum*.

Report of the Secretary of Agriculture, 1890. (Cloth 8vo, pp. 612, illustrated. Washington, D. C., 1890. Also reprints of reports of Chief of Division of Vegetable Pathology, and Chief of Division of Forestry.).

Amongst the matters of botanical interest may be cited a report upon mushrooms of the United States, by the microscopist, which is illustrated by two colored plates. Plate I contains representations of the following edible species: *Agaricus prunulus*, *A. procerus*, *A. arvensis*, *A. ostreatus*, *Russula heterophylla*, *Armillaria mellea*, *Lepiota cepæstipes*, var. *cretaceus*, and *Cortinarius cærulescens*. Pl. II is concerned with the following poisonous species: *Hygrophorus conicus*, *Russula emetica*, *Agaricus æruginosus*, *Agaricus* (*Amanita*) *vernus*, *A. Muscarius*, *Lactarius rufus*, *L. piperatus*, *Phallus impudicus*, *Boletus Satanus*, *B. felleus*, *B. piperatus*, and *Clathrus cancellatus*. Under the report of the Botanist is an article on noxious weeds, in which the following plants are described and figured: *Ambrosia trifida*, *Hieracium aurantiacum*, *Linaria Canadensis*, *Cuscuta trifolia*, *Plantago lanceolata*, and *Cenchrus tribuloides*. The Chief of the Division of Vegetable Pathology contributes in his report descriptions and colored plates of *Colletotrichum Althææ*, *C. Gossypii*, and *Glœosporium fructigenum*. Under the head of "Nut Culture," is an illustrated account by the Pomologist of *Hicoria Pecan*, both wild and in cultivation. A. H.

Revision of the American Species of Epilobium occurring North of Mexico. William Trelease. (2d Ann. Rep. Missouri Bot. Gard. 69-117; 48 plates. Reprint issued April 22d, 1891).

Professor Trelease has made a critical study of the species of this difficult genus, extending over more than two years. He has found that the greatest confusion prevails in the local floras and herbaria of this country as to the species, and bases his work on Haussknecht's "Monographie der Gattung *Epilobium*," published in 1884, although he has not been able to recognize in American material all the species maintained by that author and finds several undescribed ones to add.

Copious references to literature on the biologic features of the genus are given in the introduction. 38 species are then described at length, the following as new: *E. clavatum*, from Washington to Wyoming and Utah; *E. ursinum*, Parish. California to Washington; *E. delicatum*, Oregon, besides several new varieties. Original names are upheld, and authors cited in parenthesis if the rank of a species has been changed to variety; there is one apparent exception, however, in *E. oliganthum*, Michx., (1803) being referred as a variety to *E. lineare*, Muhl (1813). The plates illustrate the general aspect of the plants, their seed stigmas and methods of vegetative propagation. American botanists owe a debt of thanks to Professor Trelease, for bringing order out of a chaotic genus. N. L. B.

Sap and Sugar of the Maple Tree.—The. W. D. Ely. (Gard. and For. iv. 171, 172; 183, 184; 207, 208).

Notes upon the making of maple sugar by the Indians.

Sapotaceæ.—Beitraege zur Kenntnis der. A. Engler. (Engler's Bot. Jahrb. xii. 496-525).

A discussion of the structure and classification of this natural order. A considerable number of new species are described, and the priority of several genera over those adopted by Bentham and Hooker is pointed out. The items of direct interest to American botanists are as follows: *Vitellaria nitidula* is a new species from Cuba, and *Lucuma Warmingii*, Eichl. is referred to this genus; *V. tenuifolia* from Cuba and *V. glaucophylla* from Brazil are also new; *Poutaria Schenckii* and *P. crassinervia* are new species from Brazil; *Labatea ciliolata* from Brazil, *L. Tovarensis*, from Columbia; *Bumelia Mexicana* and three South American species of *Chrysophyllum* are here first described, and *Mimusops Sieberi*, Chapm., from Florida, as represented by Curtiss No. 1766, is separated as *M. Floridana*, Engl. N. L. B.

Silphium laciniatum, L. B. L. Robinson. (Bot. Gaz .xvi. 114, 115).

A description of two apparent varieties of the species and a request for specimens and memoranda.

Sisal in the Bahamas.—Cultivation of. J. I. Northrop. (Reprint. Pop. Sci. Monthly, Mch. 1891; illustrated).

A comprehensive description of *Agave rigida*, var. *longifolia* and *A. rigida*, var. *Sisalina*, with account of its surroundings and conditions connected with it.

Solanaceæ from Guatemala—Some New. John M. Coulter. (Bot. Gaz. xvi. 144, 145). *Solanum Donnell-Smithii*, *Brachistus Escuintlensis*, *Bassovia Donnell-Smithii* are described as new.

Some Early Native Flowers. F. H. Horsford. (Gard. and For. iv. 199, 200).

Species under the genera *Anemone*, *Erythronium*, *Trillium*, *Trollius*, *Mertensia*, *Dodecatheon* and *Hepatica*. The article is written from the Botanical Garden, St. Louis, Mo.

Sugar Maple.—The. (Gard. and For. iv. 170, fig. 32).

Contains an excellent representation of the typical *Acer saccharum* as it grows in New Hampshire.

Vanilla planifolia. (Bot. Mag. T. 7167).

Water Plant—A Common. Jas. H. Stoller. (Pop. Sci. News, xxv. 64, 65; illustrated).

An illustrated general description of the genus *Chara*.

West Indies—A Visit to the. A. S. Hitchcock. (Bot. Gaz. xvi. 130–141). Botanical notes on a trip during the months of Nov., Dec., and Jan., 1890-91.

Proceedings of the Club.

WEDNESDAY EVENING, MAY 27TH.

The President in the chair and twenty-three persons present.

Mrs. Sarah L. Clark, Miss T. U. Tyler, Dr. Ameen T. Haddad, Col. Delancy Floyd-Jones, and Mr. Wm. Clitus Witter were elected active members.

Dr. Rusby exhibited a collection of South American woods and remarked upon their uses and economic values.

TUESDAY EVENING, JUNE 9TH.

Dr. Morong in the chair and twenty-three persons present.

Mrs. C. A. Wood and Mrs. S. Loines were elected active members.

Miss Emma J. Thompson was elected a corresponding member.

The chairman of the Field Committee reported that more than sixty persons attended the excursion to Short Hills, N. J. June 6th, on invitation of Messrs. Pitcher and Manda. The following resolution was adopted :

> That the thanks of the Torrey Botanical Club be tendered to Messrs Pitcher and Manda for the invitation extended by them to the club to visit their gardens at Short Hills, N. J., and for their courtesy and hospitality, which made the excursion the most enjoyable of the season.

Mr. Lighthipe reported *Hieracium aurantiacum* at Woodbridge, N. J., and *Arisaema Dracontium* at Rahway, N. J.

The announced paper of the evening, " Plants collected in Middle Florida " was then read by Mr. Lighthipe.

On motion adjourned to Tuesday, Oct. 13th.

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ANNOUNCEMENT!

I will have no class in Cryptogamic Botany in Cambridge this summer. It is my plan to collect both Cryptogams and Phaenogams during July to September in the Southern Alleghanies and on the Gulf Coast, making as full sets as possible and giving special attention to plants of economic interest, as Fungi, Grasses, etc. Some photographs of forest trees and other botanical objects may be made. I shall be pleased to correspond with persons interested.

A. B. SEYMOUR,

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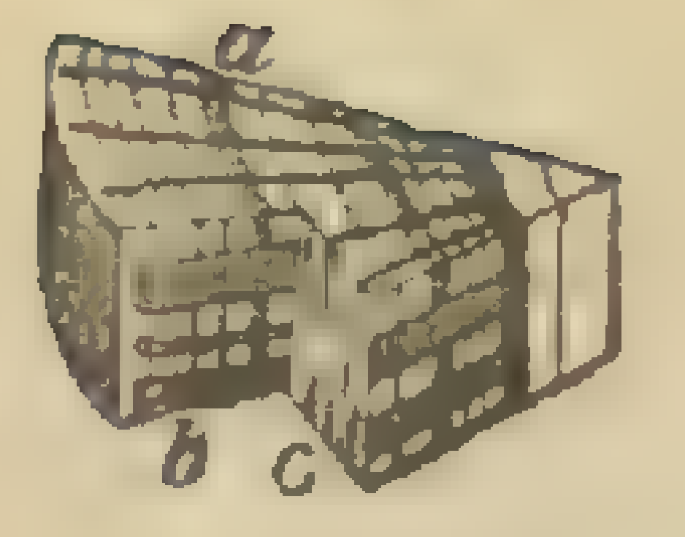

American Woods.

A publication relating to American woods, and in which each is represented by *actual and authentic* specimens so prepared as to show transverse, radial and tangential views of the grain (see figures *a*, *b* and *c*). The specimens are so thin as to allow the transmission of light, and thus the characteristic structure of each is beautifully shown. Accompanying text gives full information as to the *botanical characters*, *habitat*, *physical* and *medicinal properties*, *uses*, etc. The specimens and text are gathered together into neat cases resembling handsomely bound octavo volumes, each one representing twenty-five species, having at least seventy-five specimens, and selling at $5 00, expressage paid.

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Vol. XVIII. AUGUST, 1891. No. 8.

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EDITED BY

NATHANIEL LORD BRITTON,

AND OTHER MEMBERS OF THE CLUB.

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BULLETIN
OF THE
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Vol. XVIII.] New York, August 8, 1891. [No. 8.

Notes on North American Halorageæ.

BY THOMAS MORONG.

The order *Halorageæ* consists mostly of aquatic plants, and, as arranged by Bentham and Hooker, comprises nine genera, four of which occur in northern North America and one other in southern Mexico. These genera differ widely from each other in some important points, but so far as the structure of the ovules and embryos is concerned, form a very natural family. The Order was formerly classed by most botanists with the Onagraceæ, and in some botanical works many of the genera are still retained in that family, but they evidently differ radically from the members of that Order in nearly all the essential ordinal characteristics. *Ceratophyllum* was included among the *Halorageæ* by Bentham in his Flora Australiensis, but probably by mistake, as the peculiar embryo, the four verticillate cotyledons and the exalbuminous ovules of *Ceratophyllum* absolutely forbid its introduction into this group of plants. Curiously enough, too, Bentham's own ordinal description debars this genus from a place here.

The only objection to the arrangement of Bentham and Hooker which is likely to be made is in regard to the position of *Callitriche*, which has commonly been regarded as unique and as constituting an Order by itself. Upon a careful examination, however, it cannot be doubted that in habit, in its four-carpelled fruit, its ovules and embryos, this genus bears a very close relationship to *Myriophyllum*, while in the stamens and styles it strikingly resembles *Hippuris*, especially those forms of *H.*

montana which are monoecious. By some good judges, *Callitriche* has been included among the *Euphorbiaceæ*, with which, indeed, it has affinities, but from which it is widely divergent in having two styles and four-celled, indehiscent fruit, as well as in other characters.

The species as found in our country are, as a rule, strictly aquatic, but not invariably so, as a few of them grow on mud or moist ground by the side of streams or ponds, and two species of *Callitriche* make their home under the shade of houses or in the woods.

About thirty species are found in Canada and the United States.

The genera agree in having pendulous, anatropous ovules, nut-like or drupaceous, indehiscent, angular, costate or winged seeds, and a fleshy albumen with the embryo in its axis.

They may be briefly distinguished as follows:

Stamens one.

Ovary one-celled. Leaves verticillate, linear or obovate. 1. *Hippuris*.

Ovary four-celled. Leaves opposite, linear or spatulate. 2. *Callitriche*.

Stamens two to eight.

Fruit triangular. Leaves alternate, pectinate or pectinate-pinnatifid. 3. *Proserpinaca*.

Fruit four-sided. Leaves verticillate, subverticillate or scattered. The emersed entire, toothed or pectinate, the submerged pinnatifid. 4. *Myriophyllum*.

1. *Hippuris*. L. Gen. Pl. n. 1. (1737).

Flowers small, axillary, perfect, or by abortion sometimes neutral or pistillate. Apetalous. Calyx tube adherent to the ovary, the limb minute, entire. Stamens one, in the perfect flowers inserted on the margin of the calyx. Style filiform, stigmatic its whole length, and lying in a groove of the anther. Drupe one-celled, one-seeded. Only three species are known, all occurring in North America

Leaves linear, acute, six to twelve or more in a whorl. 1. *H. vulgaris*.

Leaves usually oval or obovate, obtuse, four to six in a whorl. 2. *H. tetraphylla.*

Very small Arctic plants, with linear, mucronate leaves, five to six in a whorl. 3. *H. montana.*

1. *H. vulgaris.* L. Sp. Pl. 4. (1753).

Springing from a perennial rootstock, with annual, simple, erect stems and whorls of six to twelve or more one-nerved linear or lanceolate leaves which are more or less decayed (sphacelated) at the tips, and 10-20 mm. long by 1-3 mm. broad. Stamens with short, thick filaments and comparatively large two-celled anthers, which dehisce laterally. Fruit oval, or somewhat four-sided, hollow in the interior, 2 or 3 mm. long, stigmas persistent. Common in Arctic America and Canada, It occurs also in Moosehead Lake, Maine (Porter), west to Oregon, and thence to California (Parish) and New Mexico. Mr. Safford sends it from the Straits of Magellan, and it is common in Europe and Central Asia.

Var. fluviatilis. Hart. Scand. Fl. 150 (1849).

A very luxuriant, deep water form, entirely or nearly submerged. Leaves 6 cm. long by 2-3 mm. wide, grass-like, numerous, in closely crowded whorls. Lake Winipeg (Macoun), Keweenaw Peninsula, Michigan (Robbins) and Oregon (Lyall). Not uncommon in Sweden.

2. *H. tetraphylla.* L. f. Supp. 81 (1781).

H. lanceolata. Retz. Obs. Fasc. 3, 7, t. 1 (1783).

H. maritima. Hell. Dis. Hipp. in Ust. Opusc. I. 11. t. 1 (1786).

This is usually a smaller plant than the preceding, rarely attaining a height of over 20 cm. Sometimes, however, as in Labrador specimens, twice that height. The leaves are in whorls of fours or sixes, oval, obovate or occasionally oblanceolate, but little, if at all, decayed at the tips, and often feather-veined. Fruit less than 2 mm. in length. It ranges from Alaska and Hudson's Bay to the Gulf of St. Lawrence, and from Sweden to Siberia.

3. *H. montana.* Ledeb. in Reich. Bot. 1. 71 (1827).

This diminutive northern plant, as Torrey and Gray remark, (Fl. N. A. p. 531), looks very much like a small *Galium.* Stems 3-6 cm. high. Leaves one-nerved, linear, mucronate, in fives or sixes, 5-6 mm. long, not decayed at the tips. Often monoecious, the flowers consisting of a single stamen or a single pistil; sometimes all the flowers in the axils of the whorls staminate. Stamens as long as the ripe fruit; filaments thick: anthers large. Fruit almost oval, minutely granulated, a little over 1 mm. in length; the persistent style shorter than the nutlet.

Turfy places in Siberia, Alaska and the Selkirk Mountains, British Columbia (Macoun).

2. *Callitriche.* L. Sp. Pl. 969. (1753).

Widely dispersed over the earth in warm and temperate climates. As usually reckoned, it numbers about twenty species, one half of them occurring in the United States. In some cases, however, the species run so close to each other that they can be distinguished only by fruit markings. In this paper Hegelmaier's classification of our North American forms is retained more for the sake of avoiding the creation of new synonyms than for any other reason. A stricter grouping would probably throw *C. verna*, *C. stenocarpa*, and *C. Bolanderi* into one. It is doubtful, too, if *C. verna* and *C. heterophylla* should be considered as distinct species, since they can be separated only by the fruit, and are constantly confounded. Each of them, also, varies more or less in the shape of the fruit, so that it is not always easy to place the specimens.

The leaves of most or all the species are covered on both sides with dark, colored dots termed by Engelman "stellate scales," and by Hegelmaier "stellate hairs." Under the microscope they appear to be composed of a dark ring in which is a slightly sunken disc with a minute cell in the centre from which radiate lines dividing the disc into several cells. They are more numerous in the aquatic than in the terrestrial species, in the former usually having four cell divisions, and in the latter eight, or sometimes split into twice as many divisions.

Authors have generally regarded the flowers as monoecious, calling the stamens and pistils separate flowers, although they may stand side by side in the same axil and enclosed in the same perigonium. In respect to this I am bound to say that I agree with Mr. Joseph Schrenk,* who observes "there is no reason why we should separate these two organs and call them two different flowers, when, in fact, they could not be any more closely connected than they really are." In the perfect flowers the stamens are clearly hypogynous, proceeding, as Mr. Schrenk states, from the same vascular bundle of which that of the pistil is a branch.

The flowers in most of the aquatic species are enclosed in a pair of small falcate or semilunar membranous bodies, which are by most authors termed bracts, by some a perianth, and by Mr. Schrenk in the article referred to floats. It is not easy to decide certainly upon the office of these bodies, but the explanation of Mr. Schrenk is ingenious and has several good reasons in its favor. That they are sacs containing air is evident. They are also most vigorous in the rosette of floating emersed leaves, where they would be of most service if really intended to impart buoyancy to the plant, decaying or shrivelling as the stem elongates. Another thing which seems to confirm this theory is the fact that they are wanting in the terrestrial species, but then, on the other hand, this is equally true of *C. autumnalis*, which is entirely submerged. Whatever may be the truth in regard to these bodies, we may properly speak of them as perigonial sacs.

As a rule, the flowers of *Callitriche* are diclinous, consisting of a single stamen or a single pistil, but in some species they will be either all perfect, or, whenever the stamen is lacking, two pistils in the same axil. Filaments elongated ; anthers reniform, two-celled, dehiscing by side slits which finally flow into one across the top. Styles two, filiform, papillose. Fruit sessile or on peduncles, which in some species are greatly elongated at maturity, compressed, four-celled, more or less winged or keeled on the margins, four-lobed, the lobes united in pairs so as to form two discs with a groove between them, separating at maturity into four flattish carpels, each containing a single seed.

Fruit pedunculate.

Perigonium none.

Peduncles minute, ⅓-½ mm. long.

1. *C. deflexa*, var. *Austini*.

---

* See his article in Bot. Gaz., 13, 296.

Peduncles stout, spreading, 2-5 mm. long. 2. *C. marginata.*

Peduncles deflexed, 2-5 mm. long, fruit rooting in the mud.

Leaves spatulate, three-nerved. 3. *C. Nuttallii.*

Leaves linear, one-nerved. 4. *C. sepulta.*

Enclosed in a perigonium. Peduncles very long. 5. *C. longipedunculata.*

Fruit sessile.

With a perigonium.

Fruit oblong, narrowly winged on the apical margin, flat on the face, styles shorter than the fruit and deciduous. 6. *C. verna.*

Fruit obovate, wings nearly wanting, plano-convex on the face. Styles longer than the fruit, persistent. 7. *C. heterophylla.*

Fruit with broad membranous wings which run around the entire margin. Styles elongated, deciduous. 8. *C. stenocarpa.*

Fruit orbicular, margins obtuse. Styles elongated, mostly deciduous. 9. *C. Bolanderi.*

Without a perigonium.

Leaves all submerged and linear. 10. *C. autumnalis.*

Leaves all spatulate. Fruit curiously gibbous at the base. 11. *C. peploides.*

1. *C. deflexa.* Braun, var. *Austini.* Hegelm. Verhandl. Bot. Brand. p. 17 (1867).

C. Austini. Englm. Gr. Man. Ed. 5, 428 (1867).

Terrestrial, 2-4 cm. high, growing on damp soil in shady woods. Leaves spatulate or obovate, three-nerved, 3-4 mm. long and nearly or quite 2 mm. broad, tapering at base into a short margined petiole. Fruit about $\frac{5}{10}$ mm. long by $\frac{8}{10}$ mm. broad, deeply notched at both ends; lobes with a narrow marginal wing or raised border and a deep groove between them; usually with a minute peduncle nearly or quite their own length. Styles persistent, shorter than the fruit, spreading or reflexed. The dried plant exhales a pleasant odor like that of *Melilotus.*

Several forms occur in Brazil, distinguished mainly by the length of the peduncle, the one regarded by Hegelm. as the type with peduncles 3-5 mm. long, and fruit somewhat larger than in ours.

New York to Washington, D. C., west to Missouri, Arkansas, Louisiana and Texas, Central and South America.

2. *C. marginata.* Torr. Bot. Whip. Ex. 135 (1856). Hegelm. Verhand. Bot. Brand. 9. 12 (1867.)

Amphibious, usually floating, sometimes growing in mud. Submerged leaves linear, one-nerved, running gradually into the emersed, which are oblanceolate or spatulate, and three-nerved, the blade 4-6 mm. long and about 2 mm. broad. Styles as long as or shorter than the fruit, reflexed, deciduous. Fruit 1-1¼ mm. long and 1½-1¾ mm. broad, with conspicuous membranous wings and divergent lobes.

Peculiar to the Pacific coast from Arizona to California. Also attributed to Chili.

3. *C. Nuttallii.* Torr. Bot. Whip. Ex. 135 (1856).

C. pedunculosa. Nutt. Trans. Am. Phil. Soc. Vol. V, n. s. 140 (1837) not Arnott nor *C. pedunculata*, D.C.

A small terrestrial species growing in moist grounds. Leaves all spatulate, three-nerved, the blade 3 or 4 mm. long and 1-1½ mm. broad, often finely wrinkled or granulated, apparently without stellate scales. Fruit thick, deeply emarginate at apex and base, ⅗-⅘ mm. in length and ⅘-1 mm. in breadth, the lobes with narrow marginal keels. Styles erect, longer than the fruit, deciduous. This and the following species are peculiar in bearing the fruit on reflexed peduncles and burying it in the mud.

First discovered by Nuttall in Arkansas and described by him under the name *C. pedunculosa*, but, unfortunately, the name had been already preoccupied.. It extends down the Mississippi to Louisiana. (Hale, Langlois.)

4. *C. sepulta.* S. Watson. Proc. Am. Ac. 14, 298 (1879.)

A small terrestrial prostrate species, similar in general appearance and habit to the preceding. Leaves linear, one-nerved, 3-5 mm. long, somewhat wrinkled or granulated below, as in *C. Nuttallii*, and apparently without stellate scale. Styles elongated, reflexed, soon deciduous, Fruit thick, about ¾ mm. long and

1 mm. broad, with very narrowly winged, divergent lobes, deeply emarginate at both ends, usually somewhat smaller than in the preceding species.

Oregon. Coll. E. Hall (No. 459) 1871.

5. *C. longipedunculata*, n. sp.

With thread-like stems; leaves all spatulate or oblanceolate, 3-8 mm. long, the blades 1-2 mm. broad, rounded at the apex and sloping into narrowly margined petioles often longer than themselves, dotted with stellate scales, three-nerved, the lateral nerves running into each other very near the apical margin. Perigonial sacs longer than the fruit. Styles much longer than the fruit, erect, deciduous. Peduncles lengthening to 10-25 cm. at maturity, and frequently two or three proceeding from the same axil, or a little below it. Fruit thick, nearly orbicular $\frac{3}{5}$-1 mm. long by about $\frac{4}{5}$ mm. in breadth, minutely emarginate, the lobes divergent, with a deep intervening groove, obtusely margined, and with or without a very narrow wing. Nearly allied to a species in the Torrey Herbarium from Constantinople labelled "*C. muscoides*, Goldbach," which has peduncles nearly as long, but with different leaves and fruit. A well marked species, collected in 1884 by C. R. Orcutt, on mesas, San Diego, California.

6. *C. verna*. L. Fl. Suec. ed. 2, 2 (1755.)

C. vernalis. Koch. Syn. ed. 1, 245 (1837) not Kütz.

Chiefly aquatic, and quite variable. Leaves of two kinds, the submerged narrow, linear, one-nerved, retuse or bifid, 10-20 mm. long, gradually changing into the emersed, which are three-nerved, 8-12 mm. long, the blade 3-4 mm. broad, spatulate or obovate, rounded and truncate or retuse at the apex, narrowing into a margined petiole, and profusely dotted with stellate scales. South American forms figured by Hegelm. have rhomboid-spatulate leaves. A terrestrial form, growing in places from which the water has receded, much smaller and more compact, has tri-nerved, obovate leaves 3-4 mm. long, and 1-2 mm. broad. There is also an entirely submerged form with the leaves all linear.

Styles chiefly shorter than the fruit, spreading, deciduous. The typical fruit of this species is oblong in shape, 1-1¾ mm.

long and ¾-1 mm. broad, flat on the face, mostly with a small apical notch and narrow apical wings, the grooves between the lobes deep. The fruit often varies from oblong to obovate, thus approaching the character of the following species.

To the terrestrial form of this species have been referred *C. brevifolia*, Pursh., and *C. terrestris*, Raf., and to the submerged form *C. linearis*, Pursh., but no one can tell without an examination of their specimens whether these authors had this or the following species in mind.

A wide-spread species, but most common in Northern waters. It occurs throughout the Dominion of Canada, and in nearly all parts of the United States. Found also in South America, Europe and Asia.

7. *C. heterophylla.* Pursh. Fl. Am. 1, 3 (1814.)

C. Asagrayi. Hegelm. Monog. p. 54 (1864.)

Very similar to No. 6 in general appearance, foliage and habits; like that it has terrestrial, submerged and intermediate forms. Fruit smaller, $\frac{3}{5}$-1 mm. long by $\frac{4}{5}$-1$\frac{1}{5}$ mm. broad, generally obovate, with a deep, broad notch at the apex, thick, almost ventricose near the base, lobes obtusely angled, with a small groove between them, wingless or with a narrow wing or raised border on the upper margin; stigmas usually longer than the fruit, erect, more or less persistent.

Frequently confounded with *C. verna.* After examining many private collections, and finding fault with the collectors for badly mixing up the two species, I was somewhat taken aback, as well as much amused, upon re-examining my own specimens collected some years since, to find that nearly all which I had marked *C. verna* were *C. heterophylla.*

This species is more common than the foregoing in Southern waters, but it occurs in Canada, and ranges from New England to Florida and Louisiana, and west to Missouri and Colorado.

8. *C. stenocarpa.* Hegelm. Verhand. Bot. Brand 10, 114 (1868 ?).

Floating leaves 10–12 mm. long, obovate, rounded and entire at the apex, three-nerved, the blade 8-10 mm. long and about 4 mm. broad, tapering into a short, margined petiole, marked with stellate scales. Submerged leaves linear. Styles erect, twice as long as the fruit, deciduous. Fruit flat, with a well marked wing on the lobes which runs into the apical notch and all around the margins, $1\frac{1}{5}$-$1\frac{2}{5}$ mm. long and 1-$1\frac{1}{5}$ mm. broad. The fruit is thinner than in *C. verna*, and the lobes less divergent, the groove about as deep. Collected by Prof. E. L. Greene near Donner Lake, Sierra Nevada, California.

9 *C. Bolanderi.* Hegelm. Verhand Bot. Brand 10, 114 (1868 ?).

Usually more branching, with larger stems and leaves than in *C. verna*, but similar to that species in general appearance and habit. Floating leaves obovate or rhombic-obovate. Fruit orbicular or slightly obovate, 1-1½ mm. in diameter, or sometimes a little longer than broad, the lobes scarcely winged, with sharp or obtuse closely approximated margins. Styles twice as long as the fruit, erect, persistent or subpersistent. A Pacific coast plant, occurring at Vancouver's Island, and other places in British Columbia, Oregon, (Hall No. 460), Washington, Placer County, (Bolander) and other places in California.

10. *C. autumnalis.* L. Sys. Nat. 2, 52, No. 13 (1767).

C. angustifolia. Hoppe. Bot. Tasch. 155 (1792).

C. virens. Gold. Act. Mosq. 5, 119 (1817).

Plant entirely submerged, very bright green when fresh, often growing in rapids. Leaves entirely destitute of stellate scales, crowded on the stem, linear-lanceolate, broader and clasping at the base, retuse or bifid at the apex, one-nerved, 10-15 mm. long. Styles about as long as the fruit, reflexed and soon deciduous. Fruit sessile or occasionally on a minute peduncle, slightly narrower than long, or orbicular, 1-2 mm. in diameter, the lobes with a deep groove between them which extends half way to the centre of the fruit, and broad wings on the margins.

Extensively diffused in northern regions. Common in Canada and British Columbia. It occurs in western Massachusetts, (Gr. Man. Ed. 6) Lake Champlain (Pringle), Sault Ste. Marie (Morong), South Colorado (Brandegee), and Harney Valley, Oregon (Howell).

11. *C. peploides.* Nutt. Trans. Phil. Soc. n. s. 5, 141 (1837).

C. Drummondi. Hegelm. Monog. 60 (1864).

A small species, creeping in mats 2-4 cm. upon moist ground, often under the shade of dwelling houses. Leaves all obovate or oblanceolate, 2-5 mm. long, ½-3½ mm. broad, the blades rounded at the apex and tapering into a short petiole, three-nerved. Style as long as or longer than the fruit, erect, deciduous or persistent. Fruit very small, sessile or on a minute peduncle, entirely unlike that of any other species, being only about $\frac{3}{5}$ mm. long by $\frac{4}{5}$ mm. broad, the lobes separated by a deep and broad apical notch, the groove between them small, the margins obtuse and wingless, contracting at the base into a raised, gibbous projection. The dried plant has a fragrance like that of No. 1.

Florida, Arkansas, Louisiana, Texas. Also in Cuba (Wright., Rugel, No. 234).

3. *Proserpinaca.* L. Act. Up. 81 (1741).

Well-known marsh or aquatic plants readily recognized by their three-celled bony triquetrous fruit. It should be noted, however, that the flowers are in rare cases four-parted, and when this occurs, the fruit is four-gonous, four-celled and four-seeded. The inflorescence is in the axils of the emersed leaves. Two species only are known, confined to North America.

Emersed leaves linear or linear-lanceolate, sharply serrate, the submerged pectinate or pectinate-pinnatifid. Fruit sharply three angled, the faces concave and usually smooth. 1. *P. palustris.*

Leaves all pinnate or pinnatifid. Fruit smaller, angles obtuse, the faces flat or slightly convex, apt to be wrinkled or tuberculate. 2. *P. pectinata.*

1. *P. palustris.* L. Sp. Pl. 88 (1753).

Trixis palustris. Gaert. De Fruct. 115, t. 24 (1788).

The submerged plants of this species may be distinguished from those of the following by the fact that the segments are commonly denticulate, and bear minute black spines in their axils, while this seldom occurs in the other.

Common in Canada, New England south to Florida, New Mexico and Gautemala, west to Minneapolis and Iowa, Cuba (Wright).

2. *P. pectinata.* Lam. Ill. t. 50, f. 1 (1791).

P. pectinacea. Torr. and Gray Fl. 1, 76 (1838). Gray Man. Ed. 6 182 (1890) not Lam.

This plant grows about as high as the preceding (20-50 cm.)

but with a more limited range, occurring in sandy ponds along the Atlantic coast from Southern New England to Florida and Louisiana.

In order to compare the number of spinulose teeth in the submerged leaves of the two species, fourteen of each were taken at random and examined. In *P. palustris* thirteen plants had them on nearly all the leaf segments and one bore them occasionally, while in *P. pectinata* eleven were entirely destitute of them, and three showed them occasionally, and these so minute as to be scarcely discernible under a lens.

4. *Myriophyllum.* L. Gen. Pl. n. 724 (1737).

Leaves for the most part verticillate (alternate in No. 4), the emersed bract-like, entire, toothed or pectinate, the submerged long, pectinate-pinnatifid, with fine capillary divisions. Flowers axillary, commonly monoecious, the staminate above with a very short calyx tube, and two to four-lobed limb or none. Petals two to four. Stamens four to eight. The intermediate flowers not unfrequently perfect. Calyx of the fertile flowers with a more or less deeply four-grooved tube, and four minute lobes or none. Ovary two to four-celled, having a single pendulous ovule in each cell. Styles four, short, often plumose and recurved. Drupe four-sided, splitting at maturity into four crustaceous, one-seeded, indehiscent carpels, which are smooth, angled or tuberculate on the back.

Fifteen or twenty species are known, inhabitants of fresh water in all parts of the world, both in the tropics and the frigid zone.

Twelve species occur in North America, which may be briefly characterized as follows:

Carpels smooth.
  Flowers on emersed spikes.
    Floral leaves shorter than the flowers. Spikes nearly naked.
      Flowers in verticils. 1. *M. spicatum.*
      Flowers alternate, or subverticillate below. 2. *M. alterniflorum.*
    Floral leaves longer than the flowers, pectinate-pinnatifid. 3. *M. verticillatum.*

Floral leaves reduced to minute bracts. 4. *M. tenellum.*

Flowers on both emersed and submersed stems.
5. *M. humile.*

Flowers on submerged stems. 6. *M. proserpinacoides.*

Carpels ridged or rough.

Flowers on emersed spikes.

Floral leaves ovate or lanceolate, serrate or entire.
7. *M. heterophyllum.*

Floral leaves linear-lanceolate, serrate or entire. Pacific coast plants. 8. *M. hippuroides.*

Floral leaves linear, pectinate toothed. 9. *M. pinnatum.*

Floral leaves pinnately parted, longer.
10. *M. Mexicanum.*

Floral leaves reduced to minute, nearly entire, spatulate bracts. 11. *M. laxum.*

Flowers on submerged stems. 12. *M. Farwellii.*

1. *M. spicatum.* L. Sp. Pl. 992 (1753).

Submerged leaves in whorls of fours and fives, the capillary divisions usually coarser than in No. 2 and No. 3. Floral leaves ovate, entire or toothed, commonly shorter than the flowers, sometimes none, leaving the spike nearly or quite naked. Spike 3-7 cm. in length. Petals four, deciduous. Stamens eight. Fruit 2½ mm. long and 2-3 mm. broad. Carpels rounded on the back, with a deep, wide groove between them. Very rarely the carpels are somewhat rugose. A deep water plant.

Common in Canada from Bear Lake to Newfoundland, New England to Minnesota, Utah and California, south to Florida. Common in Europe.

2. *M. alterniflorum.* DC. Fl. Fr. Supp. 529 (1805). Prod. 3, 68 (1828).

Submerged leaves usually in whorls of threes and fives, occasionally scattered, 6-10 mm. long, eight to ten pairs of pinnæ, the whole outline of stem and leaves narrow, 5-15 mm. in width. Spikes short, 3-5 cm. long, numerous on the branching stems. Uppermost floral leaves minute, ovate or linear, entire or minutely toothed, smaller than the flowers, early deciduous, leaving the fruiting spike naked. All the uppermost floral leaves and flowers alternate. Staminate petals four, longer than the stamens, oblong, pale, rose-colored, deciduous. Stamens eight. Fruit looking like a square block, 1½ mm. long and broad. Carpels turgid, rounded on the back with a deep intervening groove. A deep water plant.

Greenland, Lake Termiscouata (Northrop), and Lake Memphremagog, Canada, near the United States boundary (Churchill). Common in Europe.

3. *M. verticillatum.* L. Sp. Pl. 992 (1753).

Submerged leaves in crowded verticils of threes and fours, 1 to 4 cm. long, the capillary divisions ten to twelve pairs, often minutely scabrate. Floral leaves pectinate-pinnatifid, or pectinate, much longer than the flowers. Petals four, purplish in color on the sterile flowers. Stamens eight. Fruit 2 to 3 mm. long, and 2½ mm. broad, somewhat gibbous at the base.

In deep and shallow water. Ontario (Macoun's Cat.). Same range in United States as No. 2. Common in Europe.

4. *M. tenellum.* Big. Fl. Bost. 346 (1824).

Stems slender, scape-like, nearly leafless, simple, erect, 4 to 35 cm. high, nearly all out of the water, from a long rhizome, which sends up many sterile shoots. Flowers alternate, solitary, subtended by small, entire bracts, the uppermost obovate and often longer than the flowers, the lower oblong and generally shorter than the flowers, the lowest part of the spike often bractless. Stem with scattered bracts or often naked. Staminate petals four, longer than the stamens, somewhat persistent, purplish in color. Stamens four. Fruit 1 mm. long and 1 mm. broad at the apex, spreading to 1½ mm. at the base. Carpels rounded or obtusely angled on the back, the groove shallow.

Frequent in Canada, New England, New York, Pennsylvania, and west to Michigan.

5. *M. humile.* (Raf).

Purshia humilis. Raf. Med. Rep. 2nd. Hex. 3, 422 (1806).

M. ambiguum var. limosum., Nutt. Gen. 2, 212 (1818). Torr. Comp. 355 (1826). Gr. Man. Ed. 1, 140 (1848).

This plant occurs in several forms according to the situation in which it grows. These forms, when seen only in dried herbarium specimens, might be easily mistaken for distinct species, so different are they in general appearance. Each of them has received a varietal name, but they can hardly be considered as anything more than forms or states, as they readily run into each other when the conditions change.

The type of Rafinesque, commonly called by late authors var. *limosum*, is entirely terrestrial, rooting in the mud upon the shore, 2 to 4 cm. high, leaves much longer than the fruit, alternate, linear, and entire or more commonly pectinate, sometimes pinnatifid. Fruit minute, slightly more than 1 mm. long and 1 mm. or less in breadth. Carpels usually smooth, sometimes a little rough, the groove small. Petals four, purplish. Stamens four. This form appears to be the offspring of the floating plant which often roots in the mud where it is cast ashore, and sends up an erect flowering stem, frequently leaving traces of the old submerged leaves below the rooting node.

The form called *M. ambiguum* var. *natans* by Dr. Gray (Man. Ed. 1, p. 140) and which he seems to have considered the type, is intermediate between the type and the so-called var. *capillaceum*. It usually occurs in still, shallow water, with a spike of flowers and the typical floral leaves above the surface, and subverticillate or, more commonly, scattered pinnatifid leaves beneath; the divisions are few. On specimens of this from the herbarium of Mr. Oakes, marked by him *M. capillaceum*, Nutt., I find spikes nearly 30 cm. long. When botanizing on Nantucket in the summer of 1887, I found these aquatic forms together in some of the small ponds, growing in such profusion that they were literally in heaps. A note sent to Mrs. Owen, and published on page 26 of her interesting catalogue of the plants of the island, will show how intimately associated they are.

"In both these ponds the plant is at first var. *capillaceum* while immersed, but very soon it gets its head above water and immediately forms pectinate leaves—that is becomes the type as described in Gray's Manual. I have plenty of specimens in both conditions which grew together."

The form called *M. ambiguum* by Nutt. (Gen. 2, 213) and *M. ambiguum*, var. *capillaceum* by Torr. & Gray (Fl. N. A. 1, 543) and other authors, is commonly a deep water plant, entirely submerged. Stems long, widely branching, very plumose when growing, leaves all pinnatifid with hair-like divisions, subverticillate or scattered. It rarely flowers or fruits, and when it does the inflorescence may be seen scattered here and there in the axils of the leaves. One or more of the forms occur from eastern Massachusetts to Maryland and Tennessee, and west to Illinois and Indiana.

6. *M. proserpinacoides.* Gill. in Hook. Bot. Misc. 3, 313. (1833).

This is a South American species introduced from Chili or Buenos Aires, where it is a native. It has partially naturalized itself in Hopkins' pond, near Haddonfield, and other places in New Jersey, and seems to be spreading. All the plants occurring in our waters appear to have sprung from stock imported several years ago by the florist, Mr. E. D. Sturtevant, of Bordentown, New Jersey, who writes that "it is entirely hardy here, below the reach of ice or frost."

Hooker describes it as monoecious and diœcious. I have seen only pistillate plants. These are very vigorous, 10 to 40 cm. high, even lifting themselves out of the water and growing quite as well above as below it. Normally, however, it seems to be a submerged plant. Leaves all alike, smooth, glaucous, pectinate-pinnatifid, in crowded verticils of fives, 15 to 20 mm. long, pinnæ linear, twenty to twenty-five in number, the pairs opposite or subopposite, each segment about 5 mm. long, and sharply pointed. Stamens said by Gillies to be eight. Pistillate flowers axillary, about 1 mm. high, without petals, with four white plumose stigmas. Fruit not seen, but as indicated by the ovaries, the carpels should be smooth. Between the bases of the leaves and among the flowers are many small white trichomes, or hair-like bracts.

7. *M. heterophyllum.* Michx. Fl. 2, 191 (1803).

Potamogeton verticillatum. Walt. Fl. Car. 90 (1788).

Floral leaves in whorls of threes and fives, linear, ovate or lanceolate, serrate or rarely entire, much longer than the flowers, sometimes as much as 18 mm. in length and 4 mm. broad; submerged leaves verticillate or subverticillate, crowded, about 2 cm. long, with six to ten pairs of capillary pinnæ. The flowering spike occasionally attains the length of 40 or 50 cm. Petals somewhat persistent. Stamens four, very rarely six. Fruit 2 mm. long and 1½ to 1¾ mm. wide. Carpels two-keeled and usually a little scabrate on the back.

Ontario, New York, south to Florida, New Mexico and Mexico, west to Ohio and Minnesota.

8. *M. hippuroides.* Nutt. in Torrey and Gray Fl. 1, 530 (1840).

M. scabratum. Cham. Linnæa 4, 506, not Michaux.

Leaves in whorls of fours and sixes, sometimes scattered, the floral 8 to 12 mm. long, linear-lanceolate, serrate or dentate, uppermost nearly or quite entire, lowest pinnatifid ; submerged, with six to eight pairs of capillary pinnæ. Monoecious, but occasionally with only one kind of flowers on the stems, and so appearing diœcious. Petals often pink-colored, sub-persistent. Stamens four. Fruit about 2 mm. long by 1 mm. or a little more in breadth ; carpels keeled and somewhat rough, with a deep groove between them. A western form nearly allied to our Atlantic *M. heterophyllum.* Coll. by Nuttall and Hall in the Wahlamet ponds, and by Howell at Sauvie's Island, Oregon, and by Chamisso near San Francisco, E. L. Greene, Stockton, and A. B. Simonds at Clear Lake, California.

9. *M. pinnatum.* (Walt.)

Potamogeton pinnatum. Walt. Fl. Car. 90 (1788).

M. scabratum. Michx. Fl. 2, 190 (1803), and most American authors.

Leaves in whorls of threes and fives, sometimes scattered, the floral linear, pectinate, toothed or cut-serrate, the teeth comparatively few, 5 to 15 mm. long, gradually changing into the submerged, which are in crowded verticils, the capillary pinnæ sparse. Spikes 10 to 20 cm. long. Petals purplish, somewhat persistent. Stamens four, very rarely six. Mature fruit about 1¾ mm. long, and 1¼ mm. broad. Carpels strongly two-keeled and scabrate on the back, the grooves deep.

Shallow water, Rhode Island to Florida, Louisiana, Texas and Missouri.

10. *M. Mexicanum.* S. Watson Proc. Am. Ac. 25, 148 (1890).

Stems stout, much branched. Leaves in verticils, or subverticils of fours and fives, or scattered, the floral pinnatifid or toothed, the divisions remote, 10 to 15 mm. in length ; submersed pinnatifid, 20 to 30 mm. long, the divisions finely capillary, very long, in seven to ten pairs. Spikes 10 to 30 cm. in length, their lower portion often submerged.

A few of the intermediate flowers perfect. Petals oval, rose-colored. Stamens four. Fruit in specimens sent by the collector, Mr. Pringle, about 2 mm. long by 1 to 1½ mm. broad, the carpels sharply angled and ridged and occasionally scabrate on the back, with a deep, narrow groove between them.

No. 2,017, Pringle, Chihuahua, Mexico, Oct., 6, 1888.

11. *M. laxum.* Shutt. in Chapman Fl. 143 (1860).

Leaves in whorls of fours, the floral usually shorter than the flowers, the lowest pectinate-toothed or pinnatifid, the uppermost entire, linear or narrowly spatulate, sometimes all of them minute, leaving the spike apparently naked; submerged 10 to 20 cm. in length, the capillary divisions about five on a side, and placed irregularly on the rachis. Petals pink, sub-persistent. Stamens eight. Fruit nearly 2 mm. long, by 1¼ mm. wide; carpels rounded on the back, strongly tuberculate-rugose.

Ponds in middle and west Florida (Chapman).

12. *M. Farwellii.* Morong.

Recently published in these columns—BULL. TORR. BOT. CLUB, for May, 1891. Collected by O. A. Farwell on the Keweenaw Peninsula, Michigan.

Intra-carpillary Pistils and other Floral Derangements.

BY BYRON D. HALSTED.

Plate CXXI.

The normal *Petunia* flower is five-merous with its stamens adherent to the corolla tube for one half their length. In the double varieties, instead of these five stamens there may be from none to seven perfect ones, with a range of from one to fifteen which are partly transformed into petals. An average of fifteen blossoms gave 3.7 perfect stamens, and 5.3 more or less petaloid. As the corolla proper is trumpet shaped, the transformed stamens have but little space in the tube, and the petaline structures, therefore, are usually much twisted and contorted, especially for the lower portion, and frequently they are united to each other and to the inner wall of the surrounding corolla. In studying these peculiar flowers as found in abundance in the gardens, my attention was drawn to the unusual size of the petals, which, instead of having a long, slender style, carrying a green capatate stigma above the throat of the corolla, it was short and broad, and often somewhat contorted. Upon a closer inspection of this organ it was found that the contents of the pistil consisted of stamens, some of which were partly changed into petals, often highly colored, while in the center of all was a small pistil, perhaps one-third the normal size. A large number of these pistils were examined and the average was 2.73 normal stamens, about one petaloid structure, and .73 central pistil. It had lost its original shape, the color was white, or purple, in part, the top not closed, but ending in a number of tips, each bearing a portion of the peculiar green-colored stigma, while from within arose a number of tips of highly colored petals, which were much crumpled toward the base and inclosed by the ovary. When torn open such pistils contained but few normal stamens, and in the center of all stood the secondary pistil of the ordinary form, much developed, and filled with ovules. Not infrequently the ovarian stamens had their anthers tipped with a small stigmatic surface, thus indicating the close association of the sexual elements in floral structure. Upon making camera drawings of the stigmatic surface of the inner and the outer pistil a considerable difference was evident. On the primary pistil the papillæ were twice the size of those of the inner, and were covered with small globules of oil, a fact not observed with the inner stigma. This difference may be due to the inner pistil being immature. This view is supported by the fact that no great difference was found between pollen from the outer and inner stamens, the size in both varying from 45μ to 50μ.

A striking abnormality was also found in the common garden "Bouncing Bet" (*Saponaria officinalis*). Two is the normal number of styles, but in many flowers there are three of equal length, and in addition an inner and longer one, as if the placentæ had been prolonged and tipped with a style and stigma. Upon removing the three carpels the central column is left behind, along with several strands of tissue to which ovules are attached. Each of these strands ends in from two to five long, slender bodies, which, owing to lack of space, are usually somewhat twisted. The upper portion of these prolongations has the same exterior as the styles proper; they are, in other words, secondary styles with stigmas, and seem to aid in the pollenation of the ovules, which, owing to the abnormal growth, have no other means of effecting fertilization. A still more striking result of the doubling of the *Saponaria* is one that corresponds with that of the *Petunia*, and where the primary pistil becomes very large, resembling a bud in the center of a flower, in which is a tiny blossom in all its parts. There are all gradations between this last mentioned form and that where only the ordinary doubling of the stamens has taken place and a normal pistil stands in the center of the flower.

The common garden *Pæonia* is an excellent illustration of doubling in a large flower. In the ordinary blossom there are a hundred or more stamens, which nearly all disappear, and instead there are as many petals when the flower is fully doubled. Frequently the reduction of stamen to petal has not been completed, and the organ exhibits the blended characteristics of the two—a matter of common observation and meriting no further comment here. A point of more than passing interest is the behavior of the few large pistils, usually three to five, which form the central part of the doubled flower. Not infrequently one or more of these pistils become highly colored and greatly enlarged, so as to appear like unusually large, thickish, crumpled petals. In many instances there is a striking difference in color between the pistil-petals and the stamen-petals, thus offering a sharp separation between the two sets of metamorphosed organs. All gradations between the fully developed pistil-petals, with its bright color and rigid structure, and the perfect pistil, could be found upon the same plant, and frequently upon the same flower. It was not unusual to find one half of the pistil petaloid, while the balance had its free edge turned inward, bearing a few ovules along the half developed placenta. One of the most striking transformations was that where one side of the enlarged misshaped pistils bore ovules freely exposed, while the opposite edge, slightly separated from it, had developed into a much enlarged anther with its two lobes. Several flowers were found with a single stamen, seemingly occupying the position of a pistil; such stamens were many times the ordinary size, and almost sessile, upon a very thick filament not unlike the base of an ordinary ovary. This view of the centrally located stamen, sometimes actually surrounded by the pistils, is supported by the observation of a modified form combining the characteristics of both stamen and pistil. For example, an organ was found with one lobe complete, while the other terminated midway, being replaced below by a row of ovules.

Figure 1 shows an ordinary *Petunia* pistil; at figure 2 is seen one much swollen, and figure 3 exhibits a well developed specimen of the remarkable doubling. The upper portion consists of protruding, highly colored petals, while in the center of all is seen the secondary pistil. At *a* is the style and stigma of the primary pistil.

Figure 4 exhibits one of these stamen-pistils with the anther lobe conspicuous upon the right hand, and a number of imperfect ovules to the left and below.

In figure 5 is shown a section through a similarly deformed organ, with an ovule upon the left hand, and the anther lobe and pollen grains to the right.

From the size and central position, it is evident that these organs are metamorphosed pistils.

Notes upon Epigæa Repens.

By Byron D. Halsted.

Dr. Gray stated long ago* that the trailing arbutus flowers are of two kinds, each with two modifications. The two sorts are characterized by the perfection or abortive nature of pistils and stamens respectively, and the modifications resided in the varying lengths of the essential organs. The two kinds indicate a decided tendency towards diœcism, and the modifications suggest dimorphism.

Of sixty flowers. from as many plants, examined recently, forty had the stamens predominating, and in these, sixteen had the style longest, fourteen with the stigmas and anthers even, and ten having short styles. In the remaining twenty, with strong pistils, eleven had the style shorter and nine longer than the filaments. It is evident that while there is a hint of dimorphism it is not far advanced. Many kinds of flowers exhibit equally great variations and are not dimorphic. More than this, if dimorphism was prevailing we should expect to find a difference in the size of pollen between the short and long stamens, but this is not apparent. There are not two sizes as found in dimorphic flowers. It seems evident that but little stress should be laid upon the suggestion of dimorphism in this species, as the strong tendency to become unisexual is in large part sufficient to account for the greater robustness of pistil or stamen, as the case may be, which may readily include length of style or filament.

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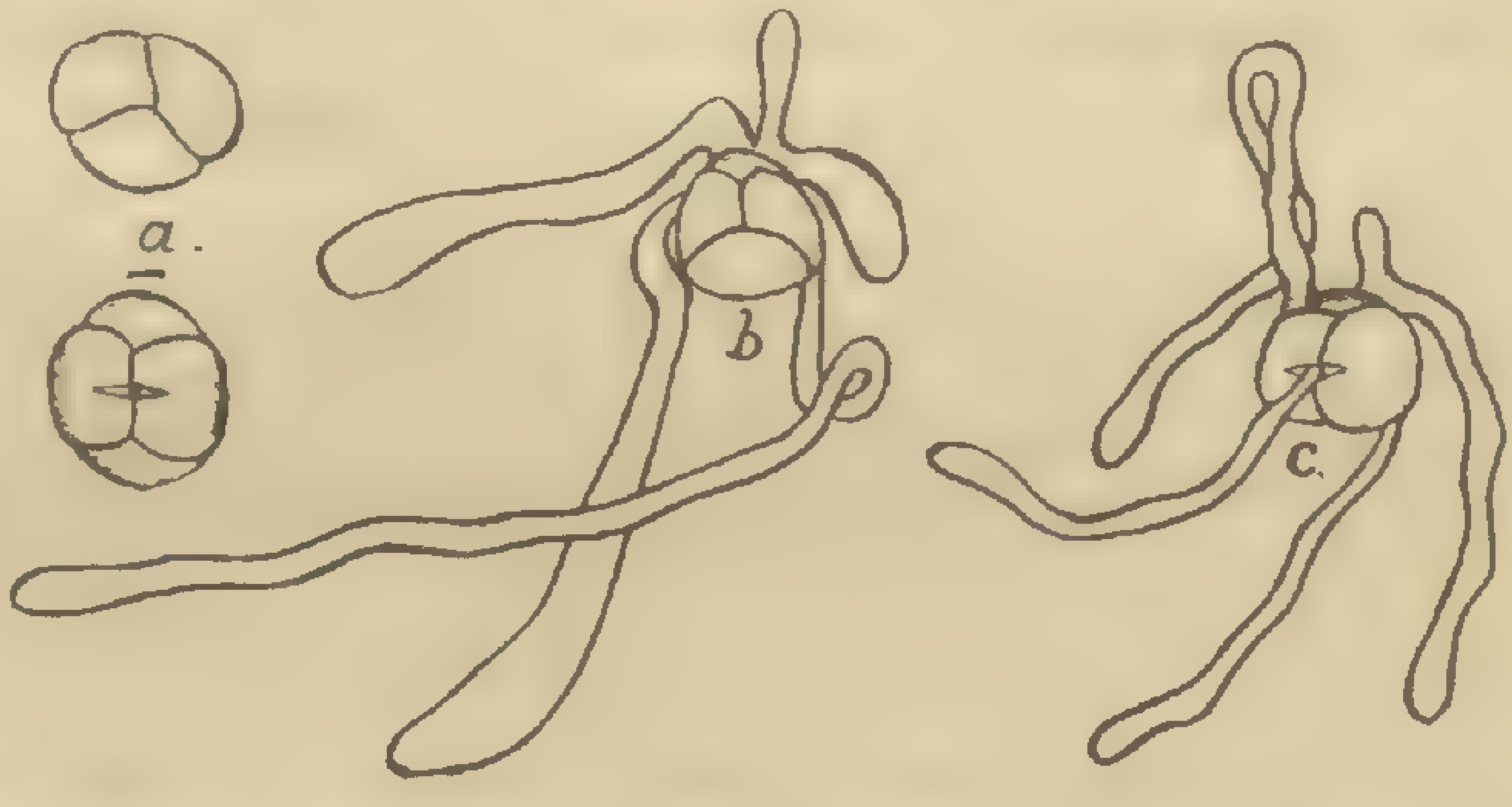
*Am. Jour. Science, July, 1876: Am. Nat., Aug., 1876.

The point uppermost in Dr. Gray's mind in publishing his observations seems still undetermined, namely: "to ascertain, if possible, whether the short-stigma blossoms ever set seed." In other words, whether there is an approximate diœcism simply, or a tendency toward dimorphism yet imperfectly attained.

The pollen of the *Epigæa* was germinated with ease in nutrient solution, and as the grains, like nearly all of the order, are united in fours, it is of interest to show that all quadrants are equally active in producing tubes. Two of the grains are shown at *a* before germination, while at *b* and *c* are seen two others that have sent out four tubes, one for each quadrant. It has been found that the best nutrient solution for the growth of the pollen is often obtained by soaking mature stigmas in water.



A Botanical Excursion to Asateague Bay.

By H. H. Rusby.

ABSTRACT.*

Asateague Bay is a shallow sound situated off the eastern Peninsula of Maryland near its southern extremity, and just at the boundary line between Maryland and Virginia. It is at present somewhat notorious as being the scene of the great oyster war now in progress. Near it lies the island of Chincoteague, especially noted for the fact that it bears a race of wild horses the origin of which is somewhat uncertain. These horses are known as " Beach Ponies, " and are quite different in form, habits and powers of endurance from our ordinary horses, considerably resembling in these points the American mustang. Every year the colts are branded, and at this time there is a regular "round-up" such as may be witnessed in Texas and Mexico.

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* Read before the Torrey Botanical Club.

The land in the vicinity of the bay is very low and level, so that the small streams, called "branches," have scarcely any current. In their vicinity the undergrowth is exceedingly dense and thorny. The land is for the most part sandy, and is covered in many parts with a growth of pine mixed with various hard woods. This pine was not examined. It exists over the entire peninsula and gives foundation to a large and important lumbering industry. My object being to spend a few days upon the sea-coast, I saw very little of the forest region, and made no collection of trees. The chief features of the flora of the shore region are as follows:

The variety of species represented upon any given area is exceedingly large, approximating the most extensive variety that I have ever seen elsewhere. Thus in a single field of about an acre, I collected something like sixty species in flower within a few days. At the same time the growth is very dense, and there are of course places where a single species or two will grow to the exclusion of almost everything else. Among the most prominent of such species may be mentioned the following: *Phaseolus umbellatus* and *P. helvolus*, that form a dense tangle over large fields. Of these the *P. umbellatus* grows in damper situations, and either trails prostrate for a long distance or ascends by twining around weeds and bushes; while *P. helvolus* inhabits higher regions of loose sand, and elevates its net work of stems about a foot above the surface of the soil, so as to render travel through it excessively wearisome. This plant, as it grows over a large area, displaying the numberless heads of its large, rose-purple or deeper colored flowers, is by no means unhandsome. Associating closely with the latter is *Cassia nictitans*, which alternates with it in large patches, while the *C. Chamæchrista* similarly associates with the *P. umbellatus*. It is important to note here that these two names of *Phaseolus* are used in their corrected application. The genuine *P. helvolus*, L., is as Dr. Britton has clearly shown, the *P. diversifolius* of Gray's Manual, while *P. umbellatus* is the *P. helvolus* of the Manual. Everywhere in damp situations abounds *Rhexia Virginica*. *Viburnum nudum* takes the place of our *V. prunifolium*, but grows in much damper locations, bordering sluggish streams in low land. Very abundant in similar locations and growing with great luxuriance is *Magnolia glauca.* Some of the swamps in the vicinity of these streams were covered with forests of *Taxodium distichum. Quercus Phellos* was the commonest oak. Other shrubby or arborescent species on drier ground were *Castanea pumila*, *Ilex glabra* and *I. opaca.* Of these the last named was abundant, large, and very handsome growing among other trees. The ribs upon the fruit of *Ilex glabra* were very prominent and quite opposed to the description given in our Manual. Another very handsome small tree was the *Symplocos tinctoria*, but a single specimen however being noted, and that having been removed from the adjacent forest to a door-yard. It was the only specimen which the residents had ever seen. In its general appearance it closely resembles a small orange tree. *Lagerstrœmia Indica* thrives finely and blooms freely in the open air, which will perhaps indicate, more clearly than anything else, the comparative mildness of the climate. In a field a few miles from the shore grows a large mulberry tree, famous throughout the region. It is much earlier than its neighbors in the maturing of its fruit, which it continues to produce until the occurrence of killing frost. These fruits do not soften and decay as those of the common species, but become whitened, membranaceous and dessicated at the tip, remaining firm but juicy within for some time. The tree puzzled me very greatly until I learned that it was the common *Morns nigra* of Europe. *Tecoma radicans* is thoroughly native, running everywhere over fences and in waste ground, and, in short, thoroughly imitating in its occurrence our *Rhus radicans.* The prevalent morning-glory is *Ipomœa Nil.* A specimen of *Anemone Virginiana* was collected in fruit with the heads of fruit doubled ; that is, apparently two heads laterally coherent. *Polygala* was well represented by five species. *P. verticillata* was typical. A form was found which it was difficult to place either in *P. sanguinea* or *P. fastigiata.* Among *Hypericums* the typical *H. Canadense* was supplemented by many forms approaching in varying degree toward *H. mutilum.* Of the latter, specimens reaching the height of over two feet, and very broadly spreading, were collected. *Stylosanthes biflora* was conspicuous, not only for the luxuriance of the plants, but the handsome flowers, larger than anything I had before seen. Along with *Hibiscus Moscheutus*, *Kosteletzkya Virginica* occurred not rarely. It is a much more slender and more branching plant. The former grew over large areas and was note-worthy for possessing a much lighter color than our northern species. Rosaceæ yielded two plants of very unusual interest. A small *Agrimonia*, abundant in grassy spots under pine trees, was markedly different from any form which I had ever seen. Very slender, with not more than two or three leaves, these almost invariably possessing only three leaflets, which are rounded, coarsely dentate, much whitened underneath and almost wanting in any secondary leaflets, makes it appear almost distinct from the *A. Eupatoria*. It is to be further studied. Scarcely less interesting was the sand blackberry of the region, growing commonly and producing an abundance of delicious fruit. Instead of small, cuneiform leaflets, it produced them from one to two inches in length and elliptical in form. Both species of *Diodia* were abundant, the flowers of *D. Virginica*, unlike those of *D. teres*, being showy, white and wax-like, and making the plant decidedly beautiful. Compositæ furnished a number of species unknown to us here, among them being *Verbesina Siegesbeckii*, *Cacalia atriplicifolia*, *Elephantopus Carolinianus*, *Polymnia Uvedalia*, both species of *Pluchea* and *Pyrrhopappus Carolinianus*. The latter was strikingly similar in its general aspect to the *P. Rothrockii* which I have collected upon the Rio Grande. Never have I found *Solidago odora* so odorous as here. One of the most interesting plants collected was a peculiar form of *Eryngium Virginianum* which grew along with the typical form. Instead of having its flowers and divisions of the umbel sessile, they possessed elongated stalks, giving the head the appearance of a loose and pretty little umbel. Not less interesting was a *Lobelia*, a single specimen of which was collected, growing remote from any other plant of the genus. It is not much like any described species, coming perhaps nearest to *L. puberula*. Its corollas, however, are much longer, of a different form, and its calyx much broader and stouter so densely white-hispid as to give it the appearance of being covered with snow-flakes. The plant is some three feet or more high, very stout and leafy. The exceeding variability of *L. puberula* will in all probability require that this plant be referred to that species. The prevailing *Lobelias* of the region are *L. inflata*, *L. cardinalis* and, particularly, *L. Nuttallii*, the latter taking the place of and closely resembling our *L. Kalmii.* A very slender form of *Steironema*, with very long pedicels, grew in water. *Asclepias rubra*, together with a very thick-leaved form of *A. purpurascens*, occurred sparingly, and were found in fruit. *Polypremum procumbens* and *Erythræa ramossissima*, the latter the Florida form, were not rare. Both species of *Mimulus* occurred, the *M. alata* readily distinguished by its petioled leaves. Here I collected for the first time *Linaria Elatine*, its very long and slender stems closely prostrate and its tiny flowers variegated with yellow, purple and white. Accompanying it in the greatest abundance, and growing similarly, was *Anagallis arvensis.* *Symphytum* was found sparingly escaped. *Solanum Carolinianum* was common. A few plants of *Lippia lanceolata* were collected. *Verbena officinalis* covered all waste land, roadsides, etc., the plants being very large. *Salvia lyrata* was conspicuous in a single locality, partly shaded by pine trees. *Teucrium* was small, slender and sparsely leaved. A single plant of *Sagittaria lancifolia* was collected, the first which I had ever seen growing. *Hypoxis erecta* was collected in a very small and slender form, which maintained its character wherever found. *Spiranthes gracilis* was the species occurring here, and readily distinguished from *S. simplex* by the possession of several roots, the best mark of distinction that I know of for these two species. Both *Xyris flexuosa* and *X. Caroliniana*, and both *Eriocaulon septangulare* and *E. decangulare* occurred in abundance.

Finally I mention one of the most striking peculiarities of habit observed. It is perhaps because the land is so very low and wet, and subject to overflow, or at least to the continued standing of water, that there is a general tendency for plants to assume an unusually erect position with a marked absence of leaves from the lower part. This was particularly noted in the case of *Trifolium pratense.* *Polygonum Pennsylvanicum*, instead of being decumbent with many broadly spreading rooting branches from the base, as we know it, grew absolutely erect, sometimes to the height of three feet or more, often entirely simple, more commonly with from one to three branches of habit similar to that of the stem, to which they ascended in close proximity. The leaves were few and strictly erect about the stem. *Euphorbia hypericifolia* was abundant, but I found no plant which branched. All grew to the height of from two to five inches, strictly erect, and naked below.

A Trip to Montauk Point, Long Island.

BY ARTHUR HOLLICK.

Montauk Point, Long Island, by reason of its comparative inaccessibility, has not been much visited by botanists. It is distant from Sag Harbor, the nearest railroad station, about seventeen miles as the crow flies, and as the journey from that point must be made by wagon the actual distance is somewhat more. The usual method of accomplishing it is to drive from Sag Harbor to Amagansett, spend the first night there, taking all the following day to reach the point and return to Amagansett. Even by this means the trip is necessarily a hurried one, and there is but little spare time for exploration on the way.

On July 4th and 5th of last year, I was able to make the trip, and it proved to be a highly interesting one. Between Sag Harbor and Amagansett the land is flat and sandy. *Tephrosia Virginiana* and *Lupinus perennis* were in profusion by the roadside, and *Echium vulgare* was abundant and conspicious just beyond the thickly settled part of Sag Harbor. From Amagansett to the Point the road first runs parallel to the beach through sand and wet meadow land. Great patches of *Hudsonia tomentosa* and *Arenaria Caroliniana* covered the ground where dry, and in the wet places were thick mats of *Oxycoccus macrocarpus* and *Arctostaphylos Uva-ursi* was everywhere. *Rhododendron viscosum* in large clumps occurred frequently, and in one of these I noted a bush bearing dark pink flowers. My first thought was that it must be a belated individual of *nudiflorum*, but a brief examination proved it to be a pink form of *viscosum*. The leaves are slightly glaucous beneath, giving a somewhat grayish-green appearance to the bush, which served to distinguish it from the mass of the other foliage. It is rather a curious coincidence that

Dr. Britton discovered the same form on the same date at High Point, N. J., and it may doubtless be looked for elsewhere. I would propose for it the name forma *roseum*. *Calopogon tuberosus* and its usual companion *Pogonia ophioglossoides* I had never seen in such profusion. After leaving the beach the road ascends into a wild, bleak region of drift hills with little ponds and patches of stunted oaks in the hollows. These pond holes I found to contain much of interest. *Castalia odorata* covered the surface of the water or grew in the mud on the edges. Some of the ponds had become completely dried up, and in such cases the old high water mark was invariably rendered conspicious by a broad band of *Œnothera*, which I did not recognize as a familiar species, but which I subsequently ascertained to be *Œ. fruticosa*, var. *linearis*. At the end of the Point I again found *Echium vulgare*, close by the light house, and a few stunted bushes of *Rosa humilis*.

Nearly all the vegetation accumulates in the hollows, as very little can live upon the bare and bleak wind-swept hills. One plant, however, has secured a permanent foothold, and seems in a fair way to become omnipotent. Some four years since, so my driver informed me, a few plants of *Cnicus horridulus* made their appearance near the western edge of the hills. The prevailing winds scattered the seeds towards the east, until now it has complete possession over miles of what was formerly fine pasture land. Upon the so-called "plains," a nearly level stretch of country about half way between the Point and Amagansett, it is no exaggeration to say that for a mile in every direction there was not a square yard of ground unoccupied by it. The prevailing form was yellow, and about one plant in twenty was red. It is traveling rapidly eastward, and bids fair to soon reach the end of the island, and to assume complete possession of the Montauk Hills. Near Amagansett a peculiar form of *Polygala polygama* attracted my attention. It occured sparingly with the typical species along a mile or more of the road, but differed from it in having pale lilac, almost white flowers. Dr. Britton has suggested for it the name forma *pallida*.

The necessity for making quick time doubtless lost to me a great deal of interest, as even in my superficial glance along the route, I saw enough to satisfy me that the region is one which would well repay careful exploration.

Botanical Notes.

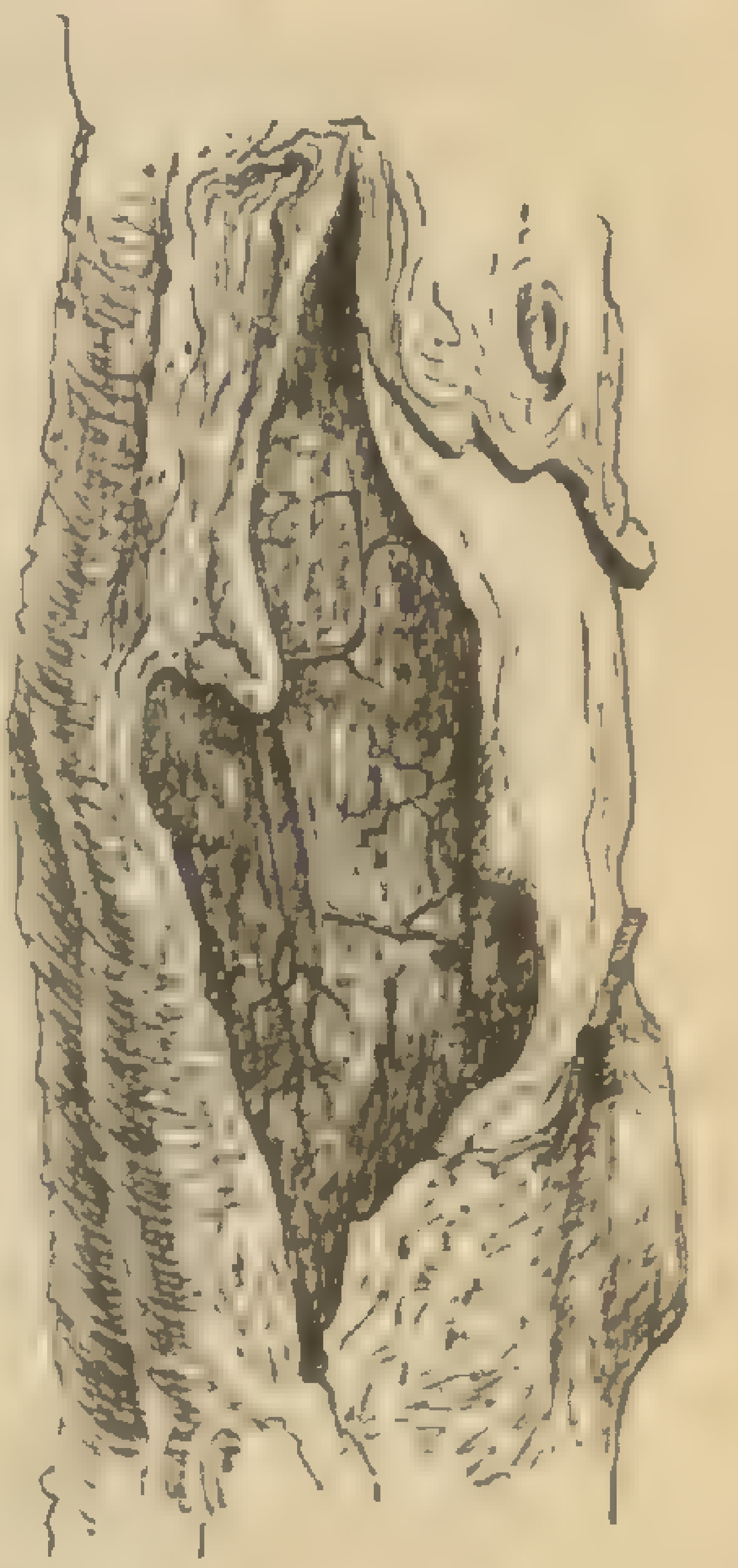
A Lichen new to the United States. *Alectoria cetrariza* (Nyl.) Eckfeldt. Thallus erect, tufted, cæspitose and spreading, slender, softish, at first compressed; lacunose and channeled beneath, the branches becoming terete; terminating in subulate extremeties, olivaceous to lead color and darkening, canescent.

Apothecia of middling size terminal and subterminal, lead colored, margin uneven, dentate or disappearing, becoming deflexed with a thin bloom. Spores ovoid-ellipsoid, hyaline continuous, quite constantly $\frac{6-7}{3-3\frac{1}{2}}$ mic.

This lichen was first discovered by Mr. Thomas Howell, in October, 1882, on the branches of small shrubs, bordering the sea, at Tillamook, Oregon. From its resemblance and relationship to the well known *Cetraria Californica*, Tuck., no doubt this interesting plant has been collected before, and distributed under an erroneous name. It is evident that this lichen is peculiar only to the northwestern coast.

JOHN W. ECKFELDT, M.D.

An Economical Linden. While walking recently in West Chester Park between Shawmut Avenue and Washington Street, of this city, my attention was attracted by a linden tree, the trunk of which was considerably decayed on one side. Closer observation showed that from a strip of living tissue at the edge of the decayed portion, there arose several adventitious roots which entered the disintegrating mass of dead wood, and ramified extensively through it, as indicated in the accompanying sketch. I have examined a number of other trees of various sorts, the trunks of which have suffered similarly from horses gnawing off the bark, but none of them have shown such an attempt as this—to utilize the products of their own decay.



FREDERICK LEROY SARGENT.

BOSTON, MASS.

Reviews of Foreign Literature.

Plantæ Europeæ Enumeratio Systematica et Synonymica Plantarum Phanerogamicarum in Europa sponte Crescentium vel mere Inguilinarum. K. Richter. (Tom. i. 8vo., pp. 378. Leipzig, 1890.)

This is the first volume of a catalogue of native and naturalized plants of Europe. It includes the Gymnosperms and Monocotyledons arranged after Engler and Prantl's "Natürliche Pflanzenfamilien," and enumerates 1839 species, 840 subspecies, 122 hybrids and 52 doubtful species. The geographical distribution is given, and in cases where the plant extends beyond Europe this is indicated, although not very comprehensively, so far as North America is concerned. There is a very full citation of synonyms, as illustrated by the following specimen:

CALYPSO, SALISB.

C. BULBOSA [L.] Rb. f. Icon. xiii. p. 158 (1851).
Syn.: *C. boreale*, Salisb. and Hook Parad. Lond. p. 89 (1806).
Cymbidium boreale, Sw. Nov. Act. Ups., p. 76 (1799).
Cypripedium bulbosum, L. Sp. Pl. p. 945 (1753).
Limnoclorum boreale, Willd., Sp. Pl. iv. p. 122 (1805).
Norna borealis, Whlb. Fl. Suec. p. 561 (1824–1826).
Orchidium boreale, Sv. Bot. viii. p. 518 (1819).

Europa borealis. (Regio arctica.)

In cases where the species has originally been described in a different genus than the one accepted, the author is cited in brackets, as in the foregoing example. In cases where it has originally been described as a species, but regarded by Herr Richter as a subspecies, or *vice versa*, the only original author is given in parentheses, thus:

SPARGANIUM ERECTUM, L. Sp. Pl. 971 (1753).
b) NEGLECTUM (Beeby), Journ. Bot. xxiii. p. 26 (1885.)

In cases where both these circumstances have obtained, both parentheses and brackets are used thus:

EPIPACTIS LATIFOLIA [(L.)], All. Fl. Ped. ii. 151 (1785).
Serapias Helleborine, var. *latifolia*, L. Sp. Pl. 949 (1753).

Original specific or varietal names are rigorously maintained, the only apparent exception being where they are identical with the generic appellation. As so large a number of European plants are identical with North American (although the actual number is evidently somewhat less than those so indicated in recent American text-books), this work of Herr Richter has an important bearing on our own Flora, and it is doubtless the most important contribution yet made towards establishing the priority of original names on the continent of Europe. We presume that the work will have little acceptance in England, but Herr Richter will have the support and the cordial thanks of nearly every American botanist. It now remains for some one to produce a similar work for North America. N. L. B.

Sur la tige des Zostera; par M. C. Sauvageau. (Journ. de Bot. V. me. anneé, p. 33).

The anatomical structure of the five known species of *Zostera* were studied and the differences in the stem structures were found sufficiently marked to be of value in the determination of the species.

Zostera marina, L. is distinguished from *Z. Capricorni*, Asch. and *Z. nana*, Roth, by the structure of the stem; *Z. nana* and *Z. Muelleri*, Irmish, are more easily separated by an examination of their leaf-structure than by that of the stems. A transverse section of their stems will prove that *Z. Muelleri* is an independent species, and not, as some authors have asserted, an Australian variety of *Z. nana*. Inversely, *Z. nana* and *Z. Capricorni* show greater differences in their leaf than in their stem structure, and *Z. Tasmanica*, G. v. Martens, is easily separated by an examination of the stems from *Z. Muelleri*, which it resembles in structure.

Recherches Anatomiques sur le Genre Carex: par. M. Bordet. (Revue Gen. de Bot. iii. 57.)

The anatomical study of rhizomes of the genus *Carex* admit of its being divided into four groups, the two first characterized by ligneous ducts, collateral or concentric, the two others by a bark formed of small intercellular spaces or showing air ducts. The size and relative number of the woody ducts in the fascicles should be taken account of. As regards the lacunæ and sclerenchyma, which often depend on age and exterior surroundings, the author does not agree with M. Laux* in drawing classificatory characters from them, as of certain cespitose rhizomes especially, it is almost impossible to determine the age. The study of the stem does not show any result applicable to classification, and though as regards the leaf there are structural differences, the author concludes that the anatomical study of the genus is not an appreciable help towards the determination of the species.

---

* Beitrag zur Kentniss der leitbundel in Rhizom monocotyler Pflanzen. Ver. Bot. Brand., 1888.

A. M. V.

Remarques sur Quelques Espèces du Genre Polygonum de l'Herbier du Jardin Botanique de l'Etat a Bruxelles, par Robert Keller. (Compt. Rend. Sèan. Soc. Roy. Bot. Belg. Année 1891, 44-49).

The references to American species of this genus make the article one of special interest to our botanists. The author has been able to note numerous varieties and modifications in the following species: *Polygonum sagittatum*, *P. Meisnerianum*, *P. pedunculare* and *P. polymorphum*. The first named is divided into Meisner's two principal varieties, *Sibiricum* and *Americanum*, but the claim is made that this does not sufficiently differentiate, especially between specimens of the latter group, and a new variety, *pubescens*, is described, from specimens collected in "wet grounds near Troy, N. Y., Leg. A. Puissant, 1870." In the last-named species the variety *foliosum* is described as new. The author's method of still further subdividing varieties appears to be decidedly of the hair-splitting order, and we hardly feel like adopting such a system as includes *Polygonum polymorphum*, Ledeb., var. *foliosum*, modificatio *glaucescens* and mod. *latifolia*, Keller.

A. H.

Editor's Notices.

On account of press of other material, the "Index to Recent Literature Relating to American Botany" is omitted this month.

It has come to our knowledge that copies of a reprint were mailed to some subscribers instead of the July number of the BULLETIN. All who failed to receive this number may obtain it by notifying the editors. It is also requested that any copies of the reprint in question be returned.

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EDITED BY

NATHANIEL LORD BRITTON,

AND OTHER MEMBERS OF THE CLUB.

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BULLETIN
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TORREY BOTANICAL CLUB.

Vol. XVIII.] New York, September 21, 1891. [No. 9.

An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885-1886.—XVII.

(Continued from p. 110).

Geophila violæfolia, DC. Prod. iv. 537. Mapiri, 5,000 ft. (2102).

Geophila cordata, Miq. Linnæa, 1843, p. 72. Mapiri, 5,000 ft. (2106). The same as Spruce No. 3870.

Nertera depressa, Banks in Gært. Fruct. i. 124. Near La Paz. 10,000 ft. (1359).

Diodia hyssopifolia, Cham. & Schlecht. Linnæa, iii. 350 (*Diodia articulata*, D.C. Prod. iv. 564). Falls of Madeira, Brazil (2101).

Diodia (?). Sorata, 10,000 ft. (2580).

Endlichera umbellata (Spr.), Schumann in Mart. Flor. Bras. vi. part 6, 38. Mapiri, 2,500 ft. (2100).

Borreria ocymoides, D.C. Prod. iv. 544. Yungas, 4,000 ft. (1944); Mapiri, 5,000 ft. (1939); Falls of Madeira, Brazil (1940).

Borreria eryngioides, Cham. & Schlecht, Linnæa, iii. 319. Falls of Madeira, Brazil (1941).

Borreria lævis (Lam.), Griseb. Flora. Brit. W. Ind. 349. Mapiri, 2,500 ft. (1857); Reis, 1,500 ft. (1937).

Borreria corymbosa (R. & P.), D.C. Prod. iv. 550. Reis, 1,500 ft. (2107).

Borreria capitata (R. & P.), D.C. Prod. iv. 545. Yungas, 4,00 ft. (1936).

Borreria verticillata (L.), Meyer. Prim. Fl. Essequib. 83, t. 1. Guanai, 2,000 ft. (1401).

Borreria latifolia (Aubl.), Schumann in Mart. Flor. Bras. vi. part 6, 61. Mapiri, 5,000 ft. (1938; 1942).

Spermacoce tenuior (L.), Lam. Yungas, 4,000 ft. (1943).

Mitracarpus hirtus (L.), D.C. Prod. iv. 572. Guanai, 2,000 ft. (1856).

Richardsonia scaber, Linn. Spec. Plant. 330. Yungas, 6,000 ft. (1969); same as Mandon's 337.

Relbunium vaillantioides (C. & S.). Schumann in Mart. Flor. Bras. vi. part 6, 115. This is exactly the plant so named at Kew, but it differs somewhat from Schumann's description. Near La Paz, 10,000 ft. (1828).

Relbunium hypocarpium (Elmg.), Hemsley, Biol. Centr. Am. ii. 63. Unduavi, 8,000 ft. (1833); Near La Paz, 10,000 ft. (1834); Mapiri, 5,000 ft. (1830); Yungas, 4,000 ft. (1836); Valparaiso, Chili (1827).

Relbunium hirtum (Lam.), Schum. l. c. Unduavi, 8,000 ft. (1838).

Relbunium pusillum (Endl.), Schumann, Mart. Flor. Bras. vi. part 6, 117. Sorata, 10,000 ft. (1842).

Relbunium ciliatum (R. & P.), Hemsley, Biol. Centr. Am. ii. 62. Sorata, 10,000 ft. (1825, 1843); near La Paz, 10,000 ft. (1837). The latter a smooth form and the same as Mandon's 326.

Relbunium hirsutum (R. & P.), Schumann Mart. Flor. Bras. vi. part 6. 116. Sorata, 10,000 ft. (1826; 1840). Same as Mandon's No. 329.

Galium Aparine, Linn. Spec. Plant. 108. Unduavi, 8,000 ft. (1829); Ingenio del Oro, 10,000 ft. (1919).

Galium obovatum, H. B. K. Nov. Gen. Pl. ii. 334. Sorata, 10,000 ft. (1832), the same as Spruce 5214; Unduavi 10,000 ft. (1841).

Galium Chilense, Hook. f. Ant. Voy. 302. Unduavi, 10,000 ft. (1835), the same as Mandon's 331, so named at Kew, but not *G. Chilense*, Endl., which name has priority. Philippi in Cat.

Pl. Vasc. Chil. 113, refers Hooker's *G. Chilense* to *G. Chonoense*, Hook.

GALIUM MANDONI, sp. nov. Caule decumbente, gracile, flaccide, angulis retrorse scabris; foliis quaternis, lineari-oblongis, sessilibus, acutis, 5-10 mm. longis, margine carinaque retrorse scabris; pedunculis solitariis, axillaribus, recurvis, unifloris, puberulis; fructibus 2 mm. longis, glabris.

Sorata, 10,000 ft. (1831); Unduavi, 10,000 ft. (1839). The same as Mandon's 334, Herb. Kew, and 333 Herb. Col. Coll.

VALERIANEÆ.

PHYLLACTIS MAPIRENSIS, spec. nov. Cæspitosis, subacaulis; foliis spathulatis, glabris, integris, obtusis, patentibus 5-6 cm. longis; caulibus simplicibus, glabris, gracilibus 10-20 cm. altus; vaginus linearibus; cymis terminalibus, 1-2 cm. latus.

Mapiri, 5.000 ft. (876). Apparently nearest to *P. spathulata* (R. & P.), Pers., but with looser cymes and entirely glabrous leaves.

Valeriana paniculata, R. & P. Fl. Per. i. 41 t. 70. Unduavi, 8,000 ft. (883); near La Paz, 10,000 ft. (870). Same as Mandon's 317.

Valeriana micropterina, Wedd. Chloris Andina, ii. 26. Mapiri, 5,000 ft. (881). The same as Mandon's 319. Unduavi, 8,000 ft. (1174).

Valeriana Pavoni, Pœpp. in Herb. Kew. Yungas, 6,000 ft. (2160). The same as Mandon 304 and Spruce 5077.

Valeriana polemonoides, H.B.K. Nov. Gen. Am. iii. p. 331. Yungas, 4,000 ft. (879). Unduavi, 10,000 ft. (884); near La Paz, 10,000 ft. (880). No. 884 is nearly the same as Spruce's No. 5,000 in Herb. Kew, determined as this species; the other two specimens are less pubescent and perhaps distinct.

VALERIANA BOLIVIANA, spec. nova. Herbacea, adscendens vel scandens, caulis fistulosis, striatis, 1m.-2m. altus, ad nodos pilosis vel glabris. Folia pinnata, vel superiores pinnatifida. Petiolus basi dilatatis. Foliola 3-7, sessiles vel breve petiolulata, ovata, lanceolata vel oblonga, obtuse dentata, vel superiores integra, supra glabra subtus principue ad venulos plus minus pilosa; inflorascentia laxe paniculata; corolla 1 mm. longa; fructus ovatis 1½ mm. longis; calycis limbo breve papposo-coronatus.

Yungas, 6,000 ft. (871, 875); Unduavi, 10,000 ft. (872, 877). Sorata, 10,000 ft. (1237). Nearest to *V. scandens*, L. The same as Mandon's 313 and 315. I may have included more than one species in this description, but I do not see any satisfactory way of separating the several specimens. I am regarding No. 871 as the type.

VALERIANA RUSBYI, spec. nova. Herbacea, erecta, pubescens, 40 cm. 50 cm. alta. Folia simplicia, integra vel undulata, ovato-lanceolata, petiolata 3 cm. 5 cm. longa, acuminata, basis cordatis. Corolla 4-5 mm. longa. Inflorascentia repitite dichotomis ramis primariis 2-3 cm. longis; fructus ovato-oblongis, 2 mm. longis.

Unduavi, 8,000 ft. (2097).

VALERIANA (?) ANDINA, spec. nova. Herbacea, glabra, erecta, 15 25 cm. alta. Caulis subaphyllis. Folia radicalia, spathulata, 5-7 cm. longa, grosse undulato-dentata, apice obtusa. Bractae 1-2, foliacea. Inflorascentia corymboso-capitata. Corolla 1 mm. longa. Near *V. oblongifolia*, R. & P., of which there is a type in Herb. Mus. Brit.

Near La Paz, 10,000 ft. (878). The same as Mandon's 307.

VALERIANA MANDONI, spec. nova. Herbacea, glabra, erecta, caule simplicio, 30-50 cm. alto, glabro. Folia radicalia longe petiolata, ovata, cordata, sinuato-dentata, 2-3 cm. longa, apice obtusa; folia caulina similia minores, sessiles vel breviter petiolata. Inflorascentia e cymulis laxifloris confecta. Corolla 3 mm. longa. Achenia late ovata 2 mm. longa.

Sorata, 10,000 ft. (874); Unduavi, 5,000 ft. (882). Same as Mandon's 303. Near *V. urticæfolia*, H.B.K.

DIPSACEÆ.

Scabiosa maritima, Linn. Amœn. Ac. iv. 305. Tacna (1788).

CALYCEREÆ.

Acicarpha procumbens, Less. Linnæa, 1831, 527. Sorata, 10,000 ft. (1376).

New or Noteworthy North American Phanerogams.—IV.

By N. L. Britton.

Ranunculus pedatifidus, Smith in Rees. Cyclop. No. 72 (1819).
R. affinis, R. Br. in Bot. App. Parry's First Voyage, 265 (1823).

Smith gives a very good account of the plant, saying that there are four specimens of it in the Linnæan Herbarium, and that it is a native of Siberia. It is now known to inhabit both northern Asia and North America The specimens are still in the Linnæan Herbarium.

Var. CARDIOPHYLLUS (Hook.), (*R. cardiophylius*, Hook. Fl. Bor. Am. i. 14 (1830); *R. affinis*, var. *cardiophyllus*, A. Gray, Proc. Acad. Phil. 1863, 56), the state of the species with entire or nearly entire radical leaves, appears to bear a similar relation to it as *R. micranthus*, Nutt. does to *R. abortivus*, L.

RANUNCULUS GRAYI.

Ranunculus pedatifidus, Hook. Fl. Bor. Am. i. 18 (1830), not of Smith (1819).

R. Hookeri, Regel, Fl. Ost. Sib. i. 47 (1862), not of Schlecht. Linnæa, ix. 610 (1834).

Schlechtendahl's *R. Hookeri* is a Mexican species.

ISOPYRUM, L. Gen. Pl. Ed. 2, 245 (1742).
Coptis, Salisb. Trans. Linn. Soc. viii. 305 (1803).

Isopyrum and *Coptis* have been kept separate by recent authors, the character depended upon for their distinction being the sessile follicles of the one and the stipitate follicles of the other. Baillon (Hist. Pl. i.) has referred *Coptis* to *Helleborus*, L. under which genus the typical species *H. trifolius*, L. was first described, and except for the vegetative characters it is certainly closely related to this genus. But taking all the known species together it seems to me more desirable to unite *Coptis* with *Isopyrum*. *Isopyrum stipitatum*, A. Gray, of the Northwest contains in itself the characters of the two genera. Our Eastern species *Helleborus trifolius*, L., will then become I. TRIFOLIUM (L).

NECKERIA, Scop. Introd. Hist. Nat. 313 (1777).
Corydalis, Vent. Choix. Pl. Cels t. 19 (1803).

This, as pointed out by Pfeffer, (Bot. Zeit. xv. 643), is the first post-Linnæan name applicable to these plants, Linnæus having regarded them as species of *Fumaria*. The pre-Linnæan name was *Capnoides*, but this was taken up by Rupp, (Flora Jen. Ed. 2,268 (1745)), for the South African plant subsequently described by Linnæus as *Fumaria vesicaria* and on which the genus *Cysticapnos* of Gærtner is based.

If we are to follow the opinion of Bentham and Hooker, as expressed in Gen. Pl. i. 56, that the South African species is congeneric with those of the northern hemisphere, then *Capnoides*, Rupp., should be applied to them all; but this plant appears to me to have sufficient characters to rank as a valid genus. I am quite aware that the adjective termination *oides* for genera, has been objected to by many authors, but it is in frequent use in zoology, and was freely used by pre-Linnæan botanists (*Cyperoides*, Tourn. =*Carex*, L., for example), and is no more adjective than *Gloriosa* L., or *Impatiens*, L., which are in common use. Scopoli's name *Neckeria* will prevent *Neckera*, Hedw. Fund. Hist. Musc. ii. 93 (1782), being used for the genus of Mosses, which has, however, received the name *Paraphysanthus*, Spruce, while *Neckeria*, Gmel. Syst. ii. 16 (1791) is the same as *Pollichia*.

Neckeria has been adopted for *Corydalis* by Mr. N. E. Brown of Kew, in his forthcoming supplement to the English Botany, and to him I am indebted for the reference to Rupp's work.

BIKUKULLA, Adans. Fam. Pl. ii. 23 (1763).

Diclytra, Borckh. in Roem. Arch. i. Pars. 2, 46 (1797).
Cucularia, Raf. Med. Rep. (II) v. 352 (1808).
Dicentra, Bernh. Linnæa, viii. 468 (1833).
Eucapnos, Bernh. loc. cit. (1833).

The adoption of Adanson's name for the plants which have recently been generally known as *Dicentras*, will happily solve the question as to the misspelling of Borckhausen's *Diclytra*. There can be no doubt of what Adanson meant, his description being clear, and his reference to Plukenet's Plate 90, fig. 3, being consulted shows this to be a pretty good representation of our *Dicentra Canadensis*. Adanson's name is based on Bicuculata, March. Mem. Acad. Paris, 1733, t. 20.

Nasturtium hispidum (Desv.) DC. Syst. ii. 201 (1821).

Brachylobus hispidus, Desv. Journ. Bot. iii. 183 (1814).

Nasturtium palustre, var. *hispidum*, A. Gray, Man. Ed. 5 (1867.)

I am satisfied that this is a distinct species from the European *N. palustre*, and in this conclusion I am strengthened by the opinions of such close observers as Mr. Bicknell and Professor Macoun. The plant is apparently strictly East American in distribution, and is one of the commonest Crucifers in our territory. *N. palustre* is rarely met with and occurs only in situations where it has been introduced. It can readily be distinguished from *N. hispidum* by its linear pods which are 4-6 times as long as thick, and by the nearly entire absence of pubescence on the stem and branches, *N. hispidum* having globose-ovoid pods, and usually considerable hirsute pubescence.

The status of the Northwestern and Rocky Mountain plant which has also been referred to *N. palustre* is more uncertain. It is commonly larger than European *palustre*, has, I believe, larger flowers and still longer pods. Professor Macoun is inclined to consider it a distinct species, but the specimens at my command do not convince me of the correctness of this view. It is certainly closer to *palustre* than *hispidum* is, and shares the peculiarity of many Rocky Mountain species in more nearly resembling European plants than do those of the eastern half of the continent.

Arabis lyrata, L. Sp. Pl. 685 (1753).

Cardamine spathulata, Michx. Fl. Bor. Am. ii. 29 (1803).

Under these circumstances it will no longer seem strange that Michaux's species which came from the Southern Alleghenies, and of which the type is preserved at Paris, has never since been found.

CORONOPUS, Hall. Helv. I. 217 (1768), fide Baillon, Hist. Pl. iii. 286: Gærtn. Fruct. et Sem. ii. 293, t. 242 (1791).

Senebiera, D.C. Mem. Soc. Hist. Nat. Paris, vii. 140, t. 89 (1799).

The earliest specific names of the two species occurring in North America may be indicated as follows:

1. *Coronopus didymus*, (L.), Smith, Fl. Brit. iii. 691 (1800).

Lepidium didymum, L. Mant; 92 (1767). *Lepidium Anglicum*, Huds., Fl. Angl. Ed. 2. 280 (1778). *Senebiera didyma*, Pers. Syn. ii. 185 (1807).

2. CORONOPUS CORONOPUS, (L). *Cochlearia Coronopus*, L. Sp., Pl. 648 (1753). *Nasturtium verrucarium*, Gars. Fig. Pl. t. 402 (1767), fide DC. *Senebiera Coronopus*, Poir. in Lam. Encycl. vii. 76 (1806).

Linnæus employed the generic name in the first edition of his Systema, (1835), but that is a mere list of genera.

POMBALIA, Vandelli Fasc. Pl. 7 (1771).

This long antedates *Ionidium* as a generic name, for the latter was not published until 1803 (Vent. Hort. Malm. 27, t. 27).

Pombalia is based on the South American plant commonly known as *Ionidium Ipecacuanhæ* which Vandelli described as *Pombalia Ipecacuanhæ*, giving a very good figure of it. There seems no good reason, then, for not using the older name. As to related genera, *Solea*, Spreng, as also older than *Ionidium*, dating from 1800, and was thought by Dr. Gray to be distinct, although united with *Ionidium* by Bentham and Hooker. *Hybanthus*, Jacq. Enum. Carib. 2 (1760) is the oldest named of the group, based upon the spiny plants of the West Indies, and Baillon unites them all under this name. But if we follow Dr. Gray in keeping up *Hybanthus*, (Bot. Gaz. xi. 293), then the next oldest name is *Pombalia*.

Silene Caroliniana, Walt. Fl. Car. 142 (1788).

Silene Pennsylvanica, Michx. Fl. Bor. Am. i. 272 (1803).

There is a specinen of this plant in Walter's Herbarium, marked " Silene an Virginica," evidently a type of his description, which fits it exactly. In the Linnæan Herbarium there is also a specimen of it marked *Virginica*, by Linnæus, but pinned fast to the sheet is another bearing a good specimen marked only " K," indicating that it was received from Kalm, of the *S. Virginica* of the description in Species Plantarum, 419. Linnæus evidently did not distinguish the two species.

CERASTIUM ERECTUM (L).

Sagina erecta, L. Sp. Pl. 128 (1753).

Cerastium quaternellum, Fenzl. Verbr. Alsin. syn. table p. 18 (1833).

This species, which was included in the earlier editions of Gray's Manual, but omitted in the 6th edition, is represented in the Kew Herbarium by abundant specimens collected by Drummond years ago at Philadelphia, and in the Torrey Herbarium by specimens from Baltimore. It does not appear to have been recently found in the United States.

Rhus typhina, L. Amœn. Acad. iv. 311 (1760).

Datisca hirta, L. Sp. Pl. 1037 (1753).

The type of *Datisca hirta* preserved in the Linnæan Herbarium is a specimen of the Stag-horn Sumach in the condition of the inflorescence reverting to leaves, a phenomenon which frequently occurs in this and related species. Linnæus had the plant from Kalm, and it was collected at Philadelphia. Although *hirta* is thus the oldest specific name associated with the plant, we are, I think, debarred from using it by the publication of *Rhus hirta*, Harv., as a synonym by Engler in DC. Monog. Phan. iv. 425 (1883), where this is referred to *R. tridentata*, Sond.

KRAUNHIA, Raf. Med. Rep. (II) v. 352 (1808); Steud. Nom. Ed. 2, i. 850.

Diplonyx, Raf. Fl. Ludov. 101 (1817).

Thyrsanthus, Ell. Journ. Acad. Phila. i. 371 (1817).

Wisteria, Nutt. Gen. ii. 115 (1818).

Rafinesque cites *Glycine frutescens*, L., as an equivalent for his proposed genus *Kraunhia*, so there is no question of the plant intended.

CRUMINIUM, Desv. Ann. Sci. Nat. (I) ix. 423 (1826).

Centrosema. Benth. Ann. Mus. Wien. ii. 117 (1840).

Clitoria § *Centrosema*, DC. Prodr. ii. 234 (1825).

The genus is founded on the plant commonly known as *Centrosema Plumieri*, Benth. (*Cruminium giganteum*, Desv.). The North American species is CRUMINIUM VIRGINIANUM (L). *Clitoria Virginiana*, L. Sp. Pl. 753 (1753). *Centrosema Virginiana*, Benth. Ann. Mus. Wein. ii. 120 (1840).

Gleditschia aquatica, Marsh Arb. Amer. 54 (1785).

This, I believe, is the oldest available name for the Water Locust of the Southern States. To be sure, as pointed out by

Prof. Greene, (BULLETIN, xvii. 14), it was called *G. inermis* by Crantz, (Inst. Rei. Herb. I. 219 (1766), and this name was subsequently used for the tree by Miller and K. Koch; but Linnæus published a *G. inermis* in Syst. Nat. Ed. 10 (1759), as cited in Richter's Codex, p. 1012, and repeated it in Sp. Pl. Ed. 2, 1059 (1763). Although this *G. inermis* of Linnæus was, apparently, a composite species made up of one from Java and the North American *G. triacanthos*, the reference to the Javanese tree by him stands first, and the species is said to come from Java. Hence we are not justified in using the same binomial published seven years later for a different plant.

SPIRÆA RUBRA (Hill).

Ulmaria rubra, Hill, Hort. Kew 214, t. 7 (1769).

Spiræa lobata, Gronov. in Jacq. Hort. Vind. i. 38, t. 88, (1770).

Hill's figure and description clearly indicate that he had this plant in mind rather than *Gillenia stipulata* (Muhl.) Max. Act. Hort. Petr. vi. 228 (*G. stipulacea*, Nutt.), as has been suggested.

Geum Canadense, Jacq. Hort. Vind. ii. 82, t. 175 (1772).

G. Carolinianum, Walt. Fl. Car. 150 (1788).

G. album, Gmel. Syst. ii. 861 (1791).

Jacquin's plate leaves no doubt as to what he intended. There is a fragment of *G. Carolinianum*, Walt. in Walter's Herbarium at the British Museum, which is apparently the same. *G. Canadense*, Murray, Comm. Soc. Goett. v. 33, t. 4, f. B. (1775), is from figure and description clearly *G. strictum*, Ait. Hort. Kew. ii. 217 (1789), of which there is a type preserved in the general herbarium at the British Museum.

Var. FLAVUM (Porter); *G. album*, var. *flavum*, Porter, Bull. Torr. Club, xvii. 21 (1890).

Saxifraga Geum, L. Sp. Pl. i. 401 (1753).

There is a specimen of this species in Durand's Herbarium at Paris, collected by the Rev. Mr. Steinhaur, in Newfoundland. It is erroneously labeled by Durand *S. spicata*, Don. This appears to be the first indication of its occurrence in America.

Parnassia grandifolia, DC. Prodr. i. 320 (1824).

P. Caroliniana, Michx. var. *β*., Hook. Jour. Bot. i. 194 (1834); T. and G. Fl. N. A. i. 149.

I believe that this southern plant is specifically different from *P. Caroliniana*, Michx. As pointed out by Hooker, the staminodia are very slender and exceed the anther-bearing stamens; the flowers and leaves are usually larger; Hooker further remarks that these characters are retained in cultivation. I have never seen elongated staminodia in our common northern plant, and am very familiar with it in the wild state. The identity of DeCandolle's and Hooker's plants appears to be satisfactorily established. We have it from North Carolina, (Rugel, Dr. Gray) Florida, (Chapman). DeCandolle's plant came from the Cherokee country, and Hooker's from Louisiana. There may be some doubt as to whether this, or what we are calling *Caroliniana*, is really the plant of Michaux, because the specimen of it is missing in his herbarium at Paris.

AMMANNIA KOEHNEI, n. sp. *Ammania humilis, β.* T. & G. Fl. N. A. i. 480 (1840).

Erect, glabrous, 6′-20′ high, at length freely branching. Leaves obovate, oblonceolate, or somewhat spatulate, obtuse or obtusish at the apex, the upper ones clasping and more or less auriculate at the base, the lower narrowed and sessile, or tapering into a short petiole; flowers 1-3 together in the axils, sessile; petals purple? fugacious; stamens very short, not exserted; style very short; capsule enclosed by the calyx.

In swamps, Hackensack marshes, New Jersey (Torrey; Leggett) to Florida. Named in honor of the distinguished monographer of the Lythrarieæ, Dr. E. Kœhne, of Berlin. The species cannot be referred to *A. latifolia*, L., which has auriculate, linear-lanceolate leaves and no petals.

Epilobium lineare, Muhl. Cat. 39 (1813).

My remarks on this species in reviewing Professor Trelease's recent Revision of the North American Epilobia (BULLETIN, this volume, p. 226), where I suggested that the name *E. oliganthum*, Michx. (1803) should have been taken for it, are quite wide of the mark, for the original in Michaux's Herbarium is *E. palustre*, L., as determined there by Haussknecht.

Epilobium glandulosum, Lehm.

Professor Trelease included this species in his treatment of the East American members of the genus in the sixth edition of Gray's Manual, but in his Revision, published subsequently, he excludes it from the range of that work, and cites its distribution as only westward. Haussknect evidently based his statement that it occurred eastward on a specimen in Michaux's Herbarium, from Tadousac, Canada, which is so labelled by him.

Tillæa aquatica, L. Sp. Pl. 128 (1753).

T. simplex, Nutt. Journ. Acad. Phil. i. 114 (1817).

Bulliardia aquatica, D.C. Prodr. iii. 382 (1828).

I have carefully compared anthentic specimens of the East American plant with the Linnæan species at London and Paris, and am convinced that the suggestion made in Torrey and Gray's Flora N. A. that they are identical is the actual fact. M. Franchet kindly compared them with me at Paris, and had no hesitation in pronouncing them identical. He also informed me that the European plant occurs on mud, as does the American.

VLECKIA, Raf. Med. Rep. (II) v. 352 (1808).

Lophanthus, Benth. Bot. Reg. xv. under t. 1282 (1829), not Adanson, nor Forster.

Rafinesque gives *Hyssopus nepetioides* as the equivalent of *Vleckia nepetoides*, which plant was long subsequently referred by Bentham to *Lophanthus*. But in addition to the fact that a genus for these plants had been thus established, the name *Lophanthus* had been used by Adanson in Fam. Pl. ii. 194 (1763) for a species of *Nepeta*, and by Forster (Char. Gen. Pl. Insul. Maris Austral. 27, t. 14 (1776), for plants now referred to *Waltheria*. Hence *Lophanthus* is, from my point of view, doubly inapplicable to the genus of Labiatæ.

Rafinesque has named all the American species under his genus in New Flora N. A. and Fl. Telluriana.

UVULARIA, L. Gen. Pl. Ed. i. p. 93, No. 263 (1737).

Oakesia, S. Wats. Proc. Amer. Acad. xiv. 221 (1879).

The characters assigned to the genus proposed by Dr. Watson appear to me to be insufficient to separate it from *Uvularia*. They are all differences of degree rather than kind, and a careful study of all the known species in the field has afforded me no other points of difference on which a genus could be maintained. But whether they be considered as congeneric or distinct, the name applied by him is not available for these plants, because it was previously given by Tuckerman to *Corema Conradii*, Torr. (Hook. London Journ. Bot. i. 445 (1842).

Botany at the A. A. A. S.

By ARTHUR HOLLICK.

Botany and botanists assumed an unusual prominence at the Washington meeting of the A. A. A. S. The address of the retiring President of the Association, Geo. L. Goodale, on "The Possibilities of Economic Botany" and that of Vice-President John M. Coulter, before Section F., on "The Future of Systematic Botany," were two of the salient events of the meeting. The subject of the complimentary lecture, tendered by the Association to the citizens of Washington, was "Illustrations of Heredity in Plant Hybrids," by John M. Macfarlane, of Edinburgh. Sixteen of the forty-eight papers read before Section F. were upon botanical subjects. Ninety-seven members and associates registered as botanists. The Botanical Club of Washington, by reason of its souvenirs to the visiting botanists, is to be credited with having produced the handsomest and most enduring mementos of the occasion, and the Division of Forestry gave them a work which will serve as a guide in determining the trees and shrubs in the public grounds of Washington for a generation to come. Finally, the fact that the botanists appealed to the Association for recognition in a separate section, in addition to the continuance of the Botanical Club, is evidence of their growing strength and argues well for the future.

Proceedings of the Botanical Club of the A. A. A. S.

THURSDAY, AUGUST 20th.

Vice-President L. M. Underwood in the chair.

The following was offered by B. E. Fernow, and on motion of J. C. Arthur was referred to Section F. for proper presentation to and with a request for action by the Association:

Whereas, The arborescent flora of the United States excels in variety of useful plants any country of the earth under one government.

Whereas, The District of Columbia and the capital of the nation are climatically so situated that nearly all the species of the North, South, East and West may be grown there in the open, or with the minimum of protection.

Whereas, The interest in arboriculture and forestry, although growing rapidly, requires an advancement of knowledge, and still more the fostering care of the Government.

Whereas, The capital is destined to become a center of learning and instruction for all classes of the people, and the accumulation of means of education and opportunities for increasing knowledge here is most desirable.

Now, the American Association for the Advancement of Science respectfully submits to the Congress of the United States the propriety of creating an arboretum in or near the District of Columbia to be established under the direction of the Department of Agriculture, and asks that a sufficient appropriation be made for such establishment at once and further appropriations for its continuance.

The following papers were read: Methods of Instruction in Vegetable Physiology, by J. C. Arthur, illustrated by apparatus used; The Perfect Stage of *Cercospora gossypina*, by George F. Atkinson; Notes on Egg Plant Diseases, by Byron D. Halsted; Distribution of Some Fungi, by L. H. Pammel.

B. E. Fernow, on behalf of the Forestry Division, U. S. Dept. Agric., presented catalogues of the trees and shrubs in the public grounds of the city, specially drepared for the visiting botanists.*

FRIDAY, AUGUST 21st.

President Wm. M. Canby in the chair.

On motion of J. N. Rose the president was authorized to appoint a committee to endeavor to secure a more favorable ruling from the Post Office authorities in regard to mailing of herbarium specimens.

The following papers were read: Preliminary Note on a Disease of Currant Canes, by D. G. Fairchild; Two New Destructive Weeds; *Orobanche ramosa* from the tobacco and hemp fields of Kentucky, and *Salsola collina* from the wheat fields of

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* *Trees of Washington, D. C.*—Geo. B. Sudworth and B. E. Fernow. (Pamph. pp. 15, two maps; compliments of the Forestry Division, U. S. Dept. Agric., Washington, D. C., Aug., 1891.) This little volume was prepared by the authors and distributed to the visiting botanists as a souvenir of the occasion, and in order to assist them in determining the trees and shrubs in the public grounds of the city. The volume is divided into two parts, the first being a complete list of all the trees and shrubsnative and introduced thus far determined throughout the city, arranged according to natural orders, and the second being lists of the species growing in the grounds of the Department of Agriculture, President's grounds and Lafayette Square. Maps accompany these latter on which each species or group of species is exactly located by number, corresponding to the number of the name in the catalogue, so that any one with this volume in hand may locate a tree or shrub, or group of them, in the above mentioned grounds, and readily ascertain the name. The number of species and varieties listed in the Department of Agriculture grounds is 253, aud in Lafayette Square and President's grounds 106. The authors express the hope that the volume may assist to increase an interest in the idea of a National Arboretum, and they have certainly taken a very pleasing way to accomplish this result. A. H.

Dakota, by J. N. Rose; Notes on a Root Gall Fungus, by Geo. F. Atkinson; Notes on the Arrow Weeds and Jumping Beans of Mexico and Central America, by C. V. Riley. [Subsequently printed in full in Am. Garden, xii. 552-554].

Dr. E. F. Smith, on behalf of the Botanical Club of Washington, presented bound volumes of photographs, representing characteristic objects and scenery in and around the city, prepared as souvenirs for the visiting botanists.* Dr. Smith also called attention to the series of mounted plants, prepared by members of the club for distribution, and invited all present to select such species as they desired.

On motion of Arthur Hollick, the President appointed a committee, consisting of Messrs. Arthur Hollick, Thos. Meehan, and V. M. Spaulding, to prepare suitable resolutions in regard to the above, to be tendered to the Botanical Club of Washington, in behalf of the visiting botanists.

SATURDAY, AUGUST 22d.

President Wm. M. Canby in the chair.

The President announced the appointment of Messrs. Thos. Meehan, J. M. Coulter, and Geo. Vasey, as the committee on mailing of herbarium specimens.

The committee appointed to prepare resolutions on behalf of the visiting botanists, to the Botanical Club of Washington, prepared the following, which were adopted:

Whereas, The members of the Botanical Club of the A. A. A. S. present at the Washington Meeting, Aug., 1891, having received, at the hands of the Botanical Club of Washington, a cordial welcome, generous treatment and handsome souvenirs of their visit.

Resolved, That the thanks of the Botanical Club of the A. A. A. S. be, and is hereby tendered to the Botanical Club of Washington, for their thoughtful acts of kindness, which have contributed materially to the enjoyment of the meeting, and will be matters for pleasant recollection in the future.

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* *Souvenir of the Washington Botanical Club. A. A. A. S.*, 1891.

This is a handsomely bound volume consisting of twenty-four photographs, representing characteristic objects and scenery in and around Washington. It was prepared by the members of the Botanical Club of Washington, and distributed to the visiting botanists as a souvenir of the occasion. The pictures are not only artistic, but are far above the average in finish, and the cover is a work of art. The volume is an ornament to any library, and will always be a pleasant reminder of the occasion that called it into existence. A. H.

L. F. Ward offered the following:

Resolved, That the sense of this club be that a Section of Botany be formed in the American Association for the Advancement of Science, and that the attention of the Council of the Association be called to the matter through the proper channel.

On motion the resolution was adopted, and Messrs. L. F. Ward, W. J. Beal, and J. M. Coulter were appointed a committee to carry it into effect.

F. L. Scribner, on behalf of the committee on nominations presented the following ticket for the next meeting, which was unanimously elected: President, V. M. Spaulding; Vice-President, Stanley Coulter; Secretary, D. G. Fairchild.

The following papers were read: (a) Changes in the Flora of Franklin Co., Ohio, During the Past Fifty Years; (b) Notes on Plants introduced at Sellsville, near Columbus, Ohio, by W. R. Lazenby; Notes on Some Curious Fungi, by Miss E. A. Southworth, illustrated by a large specimen of *Polyporus officinalis*; Notes on *Barycidamia parasitica*, by Mrs. K. B. Claypole; Method of Collecting and Preserving Myxomycetes, by O. F. Cook; A New Insect Destructive to Herbaria, the larva of a noctuid moth, resembling a small "measuring worm," of which specimens were shown, by L. H. Dewey; New or Little Known Plants of Alabama, by Chas. Mohr, in which *Clematis Addisoni*, *Quercus heterophylla* and a new *Helianthus* were mentioned.

Adjournment.

BOTANICAL PAPERS READ BEFORE SEC. F.

Another Chapter in the History of the Venus' Fly Trap, by J. W. Macfarlane.

On the Prothallium and Embryo of *Osmunda Claytoniana* and *O. cinnamomea*, by Douglas H. Campbell.

A New *Nectria*, by Byron D. Halsted.

The Compositæ Collected by Dr. Edward Palmer in Colima, by J. N. Rose. (Read by title only).

The Flora of Carmen Island, by J. N. Rose.

Notes Upon Bacteria of Cucurbits, by Byron D. Halsted.

Transpiration, or the Loss of Water in Plants, by C. E. Bessey and A. F. Woods.

Movement of Fluids in Plants, by W. J. Beal.

Absorbtion of Fluids by Plants, by L. H. Pammel.

PALÆOBOTANICAL PAPERS READ BEFORE SEC. E.

On Problematic Organisms and the Preservation of Algæ as Fossils, by Jos. F. James, in which the claim is made that the majority of so-called fossil algæ or fucoids, "are referable to tracks, trails or inorganic causes."

Principles and Methods of Geologic Correlation by Means of Fossil Plants, by Lester F. Ward, in which a strong case was made for the importance of palæobotany in assisting to determine geological horizons.

The Plant-Bearing Deposits of the American Trias, by Lester F. Ward. (Read by title).

Index to Recent Literature Relating to American Botany.

Abnormal Phyllotactic Conditions as Shown by the Leaves or Flowers of Certain Plants. Aug. F. Foerste. (Bot. Gaz. xvi. 159-166, pl. xiv).

This is one of the author's characteristic painstaking contributions. Notes on abnormal phyllotaxy are here given for *Sanguinaria Canadensis*, *Trillium sessile*, *Jeffersonia diphylla*, *Rhamnus lanceolatus*, and *Fraxinus sp.*

Alnus maritima. (Gard. and For. iv. 268, 269, f. 47).

Anatomy of Ipomœa versicolor, Meissn.—On Some Points in the. D. H. Scott. (Ann. Bot. v. 174-179. pl. xii., xiii).

Anthracnose of Cotton. Geo. F. Atkinson. (Journ. Mycol. vi. 173-178, pl. xvii., xviii).

Illustrated description of a new fungus, *Colletotrichum Gossypii*, South.

Arbutus Arizonica. (Gard. and For. iv. 317, f. 54).

Are Plums and Cherries of One Genus? E. L. Greene. (Gard. and For. iv. 250).

A discussion of the generic status of *Prunus* and *Cerasus* with incidental reference to *Pyrus* and *Malus.*

Aphelandra Blanchetiana. (Bot. Mag. t. 7179).

Bermuda in May. (Gard. and For. iv. 262, 263).

Bermuda Juniper—The. (Gard. and For. iv. 289, 290, f. 51, 52).

Illustrated description of *Juniperus Bermudiana.*

Bermuda Palmetto—The. (Gard. and For. iv. 302, f. 53).

Illustrated description of *Sabal Blackburniana.*

Bignonias. (Gard. xxxix. 10, 11, pl. 812. (colored).

The species figured in the plate is *B. Tweediana.*

Botanical Collecting in the Tropical Andes. H. H. Rusby. (Reprint from Bull. Pharm. April, 1891).

Botanical Reminiscences. H. H. Behr. (Zoë ii. 2-6).

The author's memoranda are of special interest from the fact that they date back to the days of the gold fever, when but little attention was paid to anything not mineral. Many species have been exterminated from localities where they were once abundant, and new species have been introduced. The "Reminiscences" could be paralled in nearly every growing community.

Botany of Fernando Noronha.—Notes on the. H. N. Ridley. (Journ. Linn. Soc. xxvii. 1-95; four plates).

The islands forming the group of *Fernando Noronha* lie in the Atlantic Ocean about 194 miles northeast from Cape San Roque, Brazil. They are of volcanic origin, and have never been connected with the main land. The group is about 8 miles long. Mr. Ridley gives a complete annotated list of all the plants now known to occur on these interesting islands, most of them having been collected by himself, Mr. G. A. Ramage and Rev. T. S. Lea during August and Semtember, 1887. The following new species are described, all of them endemic: *Oxalis sylvicola, Schmidelia insulana, Combretum rupicolum, Erythrina aurantiaca, Ceratosanthes angustiloba, C. cuneata, C. rupicola, Sesuvium distylum, Guettarda Leai, Palicourea insularis, Aspilia Ramagii, Bumelia fragrans, Jacquemontia euricola, Cuscuta globosa, Physalis viscida, Solanum botryophorum, Scoparia purpurea, Bignonia roseo-alba, Lantana amœna, Croton odoratus, Acalypha Noronhæ, Sapium sceleratum, Cyperus circinatus, Cyperus vialis, Cyperus Noronhæ, Paspalum anemotum, Paspalum phonoliticum, Gymnopogon rupestre* and *Riccia Ridleyi*, Gepp.

In addition to these there are a few other endemic species known from the group, published for the most part in the Botany of the "Challenger" expedition, the total number thus being about 40. Mr. Ridley points out that the remainder of the flora is made up mainly of weeds, of plants introduced by sea-currents, or of plants with berries or edible seeds. N. L. B.

Bristol Pond Bog. F. H. Horsford. (Gard. and For. iv. 290, 291).

Notes on the vegetation of the above locality, Bristol, Vt.

Bronx Park. Anna M. Vail. (Gard. and For. iv. 314, 315, f. 55).

An illustrated description of the site selected for the New York Botanic Garden, with an account of some of the wild flowers found there in May.

Bulletin No. 13 *Iowa Agricultural Experiment Station.* (Pamph. 8vo. pp. 120, Ames, Iowa, May 1891; illustrated).

Articles of botanical interest in this Bulletin may be found under the headings "Fungus Diseases," "Weed Pests," "Preliminary Report on the Examination of Some Seeds," and "Notes on Some Methods of Cross-Pollination." Subjects of illustration under the first are: *Gymnosporangium macropus*, *Puccinia Pruni-spinosæ*, *Septoria Ribis*, *S. Pruni*, *S. Ravenelii*, *Sphærella Grossulariæ*, *Phyllosticta Pyrina*, *Cylindrosporium Padi*, *Fuscicladium dendriticum*, *Uromyces Trifolii.* A weed is aptly defined to be "a plant out of place," and as such the purity of seeds sown for farm crops is of great importance. Where crop seeds are adulterated by those of weeds it is of the highest importance to be informed of the fact, and this has been the subject of examination on the part of Mr. P. H. Rolfs, with interesting results which are set forth in his "Preliminary Report" upon the subject. For example a pound of "Sanfoin" (*Onobrychis sativa*) was found to contain twenty-nine different kinds of weeds! A. H.

Cactaceæ of the Cape Region of Baja California. T. S. Brandegee. (Zoë, ii. 18-22).

Twelve species are mentioned in the genera *Mamillaria*, *Cereus* and *Opuntia.* *M. Roseana*, *C. striatus* and *O. rotundifolia* are described as new.

Carica quercifolia (*St. Hil.*), *Solms.* Thos. Morong. (Reprint from Bull. Pharm. April, 1891, illustrated).

Catalogue of the Herbarium of the Late Dr. Charles C. Parry of

Davenport, Iowa. (Pamph. pp. 82. H. N. Patterson, Oquawka, Ills.).

From the preface, by Mrs. E. R. Parry, we learn that the herbarium, of which this is the catalogue, is for sale, with the cases and a library of botanical works. The number of species represented is 6,780, of which 5,290 are North American and 770 Mexican, a large number of which are duplicated. All communications should be addressed to Mrs. E. R. Parry, Davenport, Iowa.

Cattleya Schrœderæ. W. H. Gower. (Gard. xxxix, 30, 31, pl. 813).

Choisya ternata. (Gard. xxxix. 561, illustrated).

Choreocolax polysiphoniæ, Reinsch—On the Structure and Development of. H. M. Richards. (Cont. Crypt. Lab. Harv. Univ. xv. Reprint from Proc. Am. Acad. Arts and Sci. xxvi. illustrated).

Contributions from the Cryptogamic Laboratory of Harvard University. XVI. Chas. L. Mix. (Reprint from Proc. Am. Acad. Arts. and Sci. xxvi. 102-114).

Under the title "On a Kephir-Like Yeast Found in the United States," the author discusses an American milk ferment, similar to the "kephir" of the Caucasus, from which the natives make their fermented milk. It appears to be identical with Beyerinck's *Saccharomyces kefyr.*

Contributions to the Life Histories of Plants. No. VI. Thos. Meehan. (Reprint from Proc. Acad. Nat. Sci. Phil. May 26, 1890).

The subjects contributed are under the headings: "On the causes affecting variations in *Linaria vulgaris*," "On the Self-Fertilizing Character of Compositæ," "On the Structure of the Flowers in *Dipteracanthus macranthus*," "Aerial Roots in *Vitis vulpina*," "Additional Note on the Order of Flowering in the Catkin of Willows" and "Self-Fertilizing Flowers."

Coursetia axillaris, n. sp. John M. Coulter. (Bot. Gaz. xvi. 180).

Description of a new species from San Diego, Texas.

Cypripedium Klotzschianum. (Bot. Mag. t. 7178).

Curious Case of Germination in Citrus decumana. W. G. Farlow. (Bot. Gaz. xvi. 179, 180).

This is a note to the effect that a germinating seed, with green cotyledons and plumule, was found inside a fruit of the above species. A similar instance was given in the case of a lemon [See Proc. Nat. Sci. Assn. S. I., Ocr. 8, 1887] indexed in the BULLETIN for Dec., 1887.

Difficulty of Ascertaining the Age of Certain Species of Trees in Uruguay from the Number of Rings—On the. David Christison. (Trans. and Proc. Bot. Soc. Eden, xviii, 447-455. Pl. iv).

A valuable contribution to the much discussed subject of "annual rings." Observations upon five species are given. The fact that seasonal variations cause rings similar to those caused by annual periods of rest and activity is noted, and in this connection the following words of the author are quoted: "The ages of the specimens cannot be determined with certainty by counting the rings on the blocks, except in *Robinia.* In *Melia*, zones of wood, sharply defined by lines of demarcation similar to those met with in our British trees, are seen, but the zones exceed in number the years of age of the tree. In the *Acacias* a series of wave-like rings greatly surpass in number the years of age of the trees, and it is difficult or impossible to pick out the true demarcation of the yearly growths." Even with the aid of the microscope the author confesses the impossibility at times of distinguishing the annual from the seasonal growth. He also points out the desirability of making some distinction when speaking of the annual increment and the line of demarcation between such growths, suggesting that *zone* be used to denote the former, and *ring* the latter. A. H.

Doassansia, Cornu.—Preliminary Notes on the Species of. Wm. A. Setchell. (Cont. Crypt. Lab. Harv. Univ. xiv. Reprint from Proc. Am. Acad. Arts and Sci. xxvi. 13-19).

Twelve species are described, the following as new: *Doassansia opaca*, (mentioned previously by Dr. Farlow under the name *Protomyces Sagittariæ*), *D. obscura*, *D. deformans.* The following new genera, with one species each, are described: *Burrillia pustulata* and *Cornuella Lemnæ.*

Does our Indigenous Flora give Evidence of a recent Change of Climate? J. Vroom. (Reprint from Bull. No. vii. Nat. Hist. Soc. New Brunswick).

The author endeavors to answer the question: "whether our sub-arctic plants have lingered here since the glaciers receded, or have once passed on in their northern migrations and been again driven southward to replace less hardy species; and whether a general movement in either direction is now going on." From facts observed the conclusion is reached that there has apparently been, within recent geological times, a constant amelioration of climate and a general tendency of plant migration northward.

Drymaria in Baja California. T. S. Brandegee. (Zoë, ii. 68-70).

Two new species are described in this account of the genus, viz: *D. carinata* and *D. polystachya.*

Epiphyllum. C. R. Orcutt. (West. Am. Sci. vii. 169-173, illustrated).

Erysipheæ from Carolina and Alabama—Some. Geo. F. Atkinson. (Journ. Elisha Mitchell Sci. Soc. vii., part ii. 61-74; Pl. i. and figures in text. Also reprinted).

Species under the following genera are listed: *Sphærotheca*, *Erysiphe*, *Uncinula*, *Phyllactinia*, *Podosphæra*, and *Microsphæra*. The following species are subjects of illustration: *Uncinula polychæta*, *Microsphæra Euphorbiæ*, *M. semitosta*, *M. Van Bruntiana* and *M. calocladophora.*

Eucryphia pinnatifolia. (Gard. Chron. ix. 612, f. 121).

Ferns at Home—Our. W. M. Beauchamp. (Observer, ii. No. 7, p. 5).

Fern notes from Onondaga Co. N. Y.

Flora and Fauna within Thirty Miles of Hanover, N. H. H. G. Jesup. (Cloth, 8vo. pp. 91, with map. Hanover, N. H., Jan. 23, 1891).

This is an enumeration of the Anthophyta, Pteridophyta and Vertebrata of the region mentioned. Synonomy and common names are freely given and there is a township map to illustrate localities. The number of plants listed is 1276, including 115 in cultivation.

Flora of Cook County, Illinois, and a Part of Lake County Indiana—The. Wm. K. Higley and Chas. S. Raddin. (Bull. Chicago Acad. Sci. ii. No. 1. Pamph. pp. 168, with map Chicago, 1891).

Preceding the catalogue are several articles pertinent to the subject, such as a sketch of the life of Henry Homes Babcock, to whose Catalogue of the Plants of Chicago the authors acknowledge their indebtedness; the geology of Cook Co., localities which are of special interest, etc. The total number of species and varieties listed is 1,336, of which 31 are Pteridophyta. Tables of comparison for various relations are freely given. There is a commendable attempt to break away from old traditions in nomenclature, and we are pleased to see *Castalia* substituted for *Nymphæa*, *Nymphæa* for *Nuphar*, and *Hicoria* for *Carya*, but we think it a mistake to have omitted the parenthetical citation of the author of a specific name while giving the author of the binomial. If it comes to a choice of dropping one or the other (of which we are not yet prepared to admit the necessity), it would certainly be preferable to omit the author of the binomial, and instead of *Hicoria ovata*, Britt., we should prefer to see *Hicoria ovata*, (Mill.). The notes on localities, variations from the normal of species and other matters of interest are freely introduced types and a very valuable addition to our local floras is the result.

A. H.

Flora of New Bedford and the Shores of Buzzard's Bay, with a Procession of the Flowers. E. W. Hervey. (Pamph. 8vo. pp. 80. New Bedford, Mass. May 1, 1891).

This work is something novel in the direction of catalogue making for several reasons. A large number of cultivated plants are included, which makes it valuable to those who are interested in gardening, and the "Procession of the Flowers" renders it possible for the collector to know within a few days when certain plants may be obtained in blossom. The "Procession" is arranged for periods of fifteen days, from March 15th to May 1st, after which date ten day periods are used, until September 1st, when the fifteen day periods are again quoted. Each plant which is known to begin its flowering within one of these periods is listed in its proper place. Notes are sparingly given and they are often of value and interest. Thus, in regard to *Gaylussacia resinosa* ; " A white variety of this species is occasionally brought from neighboring towns for sale, but in small quantities. A small tract of land in Berkley, about fifty feet square, has borne an annual crop of perhaps a quart of white huckleberries for forty years or more. A few bushes bearing the ordinary black huckleberry are interspersed with those bearing the white variety. The white variety has also been found in East Fairhaven." In the catalogue proper the cultivated plants are omitted, and the number enumerated, including Hepaticæ, Musci and Pteridophyta, is 1228. The author tells us that the favorite color amongst the flowers in yellow, and we are further informed that " the percentage of each color, as to number of species, is as follows : white, thirty-three ; yellow, including orange, thirty-three ; red and blue purples, fifteen ; red, including crimson, scarlet and rose, twelve ; blue, seven." The nomenclature is that of the sixth edition of Gray's Manual. A. H.

Flora of the High Nebraska Plains—The. P. A. Rydberg. (Am. Nat. xxv. 485, 486).

Fuchsias as Climbers. (Gard. xxxix. 458, 459 Pl. 805, colored, and figs. in text). *Fuchsia dependens* is the subject of the colored plate and *F. globosa* and *F. serratifolia* are figured in the text.

Fungi—North American. Fourth Paper. A. P. Morgan. (Journ. Cincinn. Soc. Nat. Hist. xiv. 5-21. Pl. i, ii, also reprinted).

The genus *Lycoperdon*, with thirty-one species, sixteen of which are figured, is the subject of this contribution.

Geographic Limits of Species of Plants in the Basin of the Red River of the North. Warren Upham. (Proc. Boston Soc. Nat. Hist. xxv. Part 1, 140-172).

The scope of this article is comprehensive, and, like all of the author's contributions to science, bears the impress of conscientious and careful work. The meteorology and physiography of the region are first described, after which the trees and shrubs are mentioned, and then follow lists of the herbaceous plants, under the headings " Northern Species Extending to the Basin of the Red River," " Western Species Extending to the Basin of the Red River," "Principal Grasses in the Basin of the Red River," "Maritime Plants in the Basin of the Red River," and "Principal Weeds, Indigenous and Naturalized, in the Basin of the Red River." The influence of the Ice Age upon the distribution of plants is discussed, and in reference to the region in question the author says: "The entire basin of the Red River of the North was covered by the ice-sheet, which also extended south to Saint Louis, and southwestward beyond the Missouri River, at the time of its maximum area in the early part of the Glacial Period, and to Des Moines, Yankton, the Coteau du Missouri, and the Elbow of the South Saskatchewan, at the time of its later great incursion. * * * Arctic and boreal plants were driven south during these epochs, to the central part of the United States, and at the close of the Ice Age they followed the receding ice-sheet and again took possession of the great northern region from which they had been expelled. With the restoration of a temperate climate throughout the northern United States and southern Canada, the arctic species found themselves no longer able to survive there, excepting in the cool heights of mountains, notably the White Mountains and the Adirondacks, and, in the case of a few species, on the cool, high northern shores of Lake Superior, and in the adjacent Isle Royal."

A. H.

Geological Position of the Catskill Group—The. Charles S. Prosser. (Reprint from Amer. Geol., June, 1891).

The author discusses the probable geological position of the Catskill Group, making special use of the palæo-botanical evidence. A list of thirteen fossil plants is given from the New York and Pennsylvania areas, and another of nineteen species from Perry, Maine.

Growth Periodicity of the Potato Tuber.—On the. Conway Macmillan. (Am. Nat. xxv. 462-469. Also reprinted).

Gymnosporangium (*Cedar Apples*)—*The Connecticut Species of.* Roland Thaxter. (Bull. No. 107, Conn. Agric. Exp. Sta. New Haven, Conn., April 15th, 1891).

The following species are described and their host plant noted: *Gymnosporangium Ellisii*, *G. clavipes*, *G. conicum*, *G. macropus*, *G. globosum*, *G. biseptatum*, *G. clavariæforme*, and *G.*

nidus-avis, the latter a new species, inducing a "birds nest" distortion in *Juniperus Virginiana*.

Host Index of the Fungi of the United States.—A Provisional. —Part III. W. G. Farlow and A. B. Seymour. (Pamph. pp. 83. Cambridge, June, 1891).

This third and final part of the index contains the last installment of the plant hosts, with an addendum of some thirty pages, a list of animal hosts, and an index covering the entire work.

Insects and the Forms and Character of Flowers—On the Relation Between. Thos. Meehan. (Bot. Gaz xvi. 176, 177).

Later Life-History of the Flowering Dogwood—Notes on the. M. A. Read. (Pop. Sci. News. xxv. 47. 48, illustrated).

An article, designed for popular reading, upon evolution in the genus *Cornus*. *C. florida* and *C. Canadensis* are figured.

Letters received from Mr. Graham Kerr, Naturalist to the Pilcomayo Expedition. (Trans. and Proc. Bot. Soc. Edin., Dec. 1890, 33-40, and March, 1891, 80-87).

Contain many notes on the vegetation of the region.

Life-History of a Stipitate Fresh Water Alga. George Massee. (Journ. Linn. Soc. xxvii. 457-462; one plate).

An account of the development of *Dictyosphærium Ehrenbergianum*, Næg., a plant common to Europe and America.

List of Plants collected by Dr. Edward Palmer in 1890, *in Western Mexico and Arizona, at i. Alamos, ii. Arizona.* J. N. Rose. (Cont. U. S. Nat. Herb. i., No. iv. Pamp. 8vo. pp. 127, ten plates. Washington, D.C., June 30th, 1891).

The following are described and figured as new: *Stellaria montana*, *Diphysa racemosa*, *Echinopepon cirrhopedunculatus*, *Tithonia fruticosa*, *Bidens Alamosanum*, *Hymenatherum anomalum*, *Perezia montana*, *Cordia Palmeri*, *Ipomæa alata* and *Tabebuia Palmeri*. Others described but not figured are: *Sida Alamosana*, Watson, ined.; *Ayenia paniculata*; *A. truncata*; *Bunchosia Sonorensis*; *Rhus Palmeri*; *Hosackia Alamosana*; *Brongniartia Palmeri*; *Willardia* [n. gen.] *Mexicana*; *Piscidia mollis*, called "palo blanco" from its white appearance; *Mimosa* (*Leptostachyæ*) *Palmeri*; *Lysiloma Watsoni*; *L. Acapulcensis*, Benth. var. *brevispicata*; *Pithecolobium Mexicanum*; *Schizocarpum Palmeri*; *Vernonia* (?) *Palmeri*; *Erigeron Alamo-*

sanum ; Zinnia linearis, Benth. var. *latifolia ; Sclerocarpus spatulatus ; Zexmenia fruticosa ; Viguiera montana ; Tithonia Palmeri ; Perityle effusa ; Metastelma latifolia ; Cordia* (*Sebestinoides*) *Sonoræ*, [under which description reference is made to Pl. ix, designated *Corda Palmeri*] ; *Ipomœa Grayi ; Solanum* (*Androcera*) *Grayi ; Salvia* (*Calosphace*) *Alamosana ; Bœrhaavia Alamosana ; B. Sonoræ ; Euphorbia* (*Poinsettia*) *tuberosa; Croton* (*Eucroton*) *Alamosanum ; Sebastiana Palmeri ; Tradescantia Palmeri ; Leptorhrœa tenuifolia ; Paspalum setaceum*, Michx., var. *pubiflorum ; Boutelona Alamosana ; Clematis Palmeri ; Hymenopappus radiata* and *Carex hystricina*, Muhl., var. *angustior.* In addition to the above there are descriptions of new plants in a number of different genera, to which specific names have been given, and valuable notes and memoranda are to be found upon nearly every page. It is more than a mere list , and the plates are above the average. A. H.

Loco Weeds. L. H. Pammel. (Vis Medicatrix, i. 40, 45, illustrated).

Several species are mentioned as producing "loco" effects, belonging to the genera *Oxytropis, Astragalus, Crotalaria, Gompholobium, Corydalis, Malvastrum, Physostigma* and *Sophora. Stipa viridula*, var. *robusta*, is also said to be "a good loco weed." *Crotalaria sagittalis* is the subject of illustration.

Lycastes Harrisoniæ, var. *eburnea.* (Am. Gard. xii. 407, figured).

Manual of the Phanerogams and Pteridophytes of Western Texas. John M. Coulter. (Cont. U. S. Nat. Herb. ii. No. 1. Pamph. pp. 152. one plate, Washington, D.C., June 27, 1891).

This is a work which will be highly appreciated by every botanist for the region lying west of the ninety-seventh meridian, in Texas. It is to be issued in parts, the present one including the Polypetalæ only. The keys and descriptions seem clear, useless synonomy is avoided, and there is a gratifying attempt at independence in the matter of nomenclature which augurs well for the work. *Thelypodium Vaseyi*, n. sp. is figured.

Masdevallia platyglossa. (Bot. Mag. t. 7185).

Migration of Weeds—The. Byron D. Halstead. (Reprint from Proc. A. A. A. S. xxxix. 304-311).

Missouri Botanical Garden. Second Annual Report. Wm. Trelease. (Cloth, 8vo. pp. 117, illustrated).

This includes, in addition to the executive report, the author's revision of the American species of *Epilobium* occurring north of Mexico.

Monomialism. L. H. Bailey. (Bot. Gaz. xvi. 215, 216).

The latest contribution to the nomenclature discussion.

Mycological Notes.—II. Geo. Massee. (Journ. Mycol. vi. 178-184. Pl. vii).

Sarcomyces and *Dacryopsis* are described as new genera. *Sarcomyces vinosa*, *Peziza protrusa*, *Stamnaria Pusio*, *Cyphella Tela*, *Dacryopsis gyrocephala*, *D. Ellisina*, *D unicolor*, *D. nuda*, and *D. enata*, are figured, and descriptions given of other species.

Our Native Plants.—II. (Vick's. Mag. xiv. 179, 180, illustrated).

Contain representations of *Arisæma triphyllum* and *Claytonia Caroliniana.*

Native Orchids—A Few. Mrs. Preston Lovell. (Am. Nat. xxv. 248-251).

An article that was probably written for *St. Nicholas* or *Young People*, and was printed by mistake where we now find it.

Native Shrubs of California, V, VI. E. L. Greene. (Gard. and For. iv. 243, 255, 256).

Notes on species of the genera *Cerasus*, *Prunus* and *Amygdalus.*

New Astragalus—A. T. S. Brandegee. (Zoe, ii. 72).

A. coccineus is described as new, from the Inyo Range and slopes of Mt. Whitney.

New or Noteworthy Species.—X. E. L. Greene. (Reprint from Pittonia, ii. 161–166).

The following species are described: *Berberis pumila*, *Tellima scabrella*, *T. nudicaulis*, *Saxifraga Howellii*, *S. Marshallii*, *S. Californica*, *Gayophytum lasiospermum*, *Chorizanthe Nortoni*, *Eriogonum Nortoni*, *E. aguinum*, *E. Jepsonii*, *Senecio hesperius*, and *S. Rawsonianus.*

New or Peculiar North American Hyphomycetes—On Certain. Roland Thaxter. (Bot. Gaz. xvi. 201-205, pl. xix, xx).

The following new genera are described: *Helicocephalum*, with *H. sarcophilum* as n. sp.; *Gonatorrhodiella*, with *G. parasitica* as n. sp.; *Desmidospora*, with *D. myrmecophila* as n. sp.; a new species described is *Everbatia lignatilis*. All are figured. *E. hymenuloides*, Sacc. and Ell., is figured for comparison with the preceding.

New Plants from Arizona, Utah and Nevada. Marcus E. Jones. Zoe. ii. 12-17).

The following species are described: *Astragalus Moencoppensis*, *A. sophoroides*, *Frasera Utahensis*, *Cercocarpus Arizonicus*, *Cymopterus megacephalus*, *Laphamia Gilensis*, *Eriogonum flexum*, *Stanleya elata*, and *S. albescens*.

Nomenclature—Notes on. George B. Sudworth; N. L. Britton; B. E. Fernow. (Gard. and For. iv. 165, 166; 202; 213, 214; 239).

Mr. Sudworth favors the use of specific names identical with generic in binomials if the name has priority, and points out the fact that *Negundo aceroides*, Mœnch, which was originally described as *Acer Negundo*, L., should be called *Negundo Negundo* if the genus *Negundo* is to be maintained; likewise *Catalpa bignonioides*, Walt., would become *Catalpa Catalpa*, and *Sassafras officinale*, Nees., would become *Sassafras Sassafras*. He refers to the use of this method by zoologists, and calls attention to Dr. Britton's non-acceptance of it in his recent catalogue of the plants of New Jersey.

Dr. Britton expresses himself in favor of the method, and states why he did not adopt it in the New Jersey Catalogue. He further favors the citation of the original author of the name only, as is done by the zoologists; as for example; *Catalpa Catalpa* (L.), not *Catalpa Catalpa*, Sudworth, nor *Catalpa Catalpa* (L.) Sudworth.

Mr. Fernow favors the double citation.

Mr. Sudworth, returning to the topic, maintains that inasmuch as the genus *Bladhia*, Thunb., (1781), is equivalent to, and antedates *Ardisia*, Sw., (1797), the West Indian and Floridian tree which has recently been known as *Ardisia Pickeringia*, originally published by Nuttall as *Cyrilla paniculata*, should be called *Bladhia paniculata;* also, that the name *Persea Caro-*

linensis, Nees., should be *Persea Borbonia,* as already pointed out in these columns.

Norfolk Island Pine—The. (Gard. xxxix. 561, illustrated).
Contains cut of *Araucaria excelsa.*

Notes on some Western Cherries. E. L. Greene. (Reprint from Pittonia, ii. 159-161).

The author states that specimens of *Cerasus demissa* from the West have frequently been collected and labeled as *C. Virginiana,* which latter species, he contends, does not occur west of the Rocky Mountains. The species previously described as *C. Californica* by the author, is here referred to *C. emarginata,* Dougl., and the specific rank of *C. mollis* is the subject of a short note.

Nuphar advena. (Meehan's Monthly, i. 17, 18, pl. 2).

Paullinia tortuosa (Benth.) T. S. B. (Zoë. ii. 74).

A note to the effect that *Cardiospermum tortuosum* belongs in the genus ***Paullinia.***

Peach Rosette—The. Erwin F. Smith. (Journ. Mycol. vi. 143-148, Pl. viii-xiii).

Illustrated description of a disease previously erroneously attributed to the beetle *Scolytus rugulosus.*

Penetration of the Host by Peronospora gangliformis. W. H. Rush. (Bot. Gaz. xvi. 208, 209, illustrated).

Pestalozzia insidens—The Fungus. J. L. Zabriskie. (Journ. N. Y. Mic. Soc. vii. 101, 102; Pl. 28).

Pitcher Plant or Side Saddle Flower—The. H. L. Clarke. (Vick's Mag. xiv. 213-215, illustrated).

Sarracenia purpurea is figured and described.

Plants peculiar to Magdalena and Santa Margarita Islands—The. T. S. Brandegee. (Zoë. ii. 11, 12).

The following species are noted: *Gongylocarpus fruticulosus, Mamillaria Halei, Agave Margaritæ, Brickellia hastata* and *Viguiera subincisa*

Plates prepared Between the Years 1849 *and* 1859, *to Accompany a Report on the Forest Trees of North America.* Asa Gray. (Pamph. 4to, 23 plates. (Smithsonion Inst. Washington, D. C., May, 1891).

This is a volume of natural sized colored representations of the following species: *Magnolia grandiflora, M. glauca, M. umbrella,* *M. auriculata, Liriodendron tulipifera, Tilia Americana, Acer rubrum, A spicatum, Æsculus glabra, Æ. discolor, Æ. parviflora, Robinia psaudacacia, R. viscosa, Cercis Canadensis, Gymnocladus Canadensis, Gleditschia triacanthos, Prunus Americana, P. Chicasa, P. Pennsylvanica, P. Virginiana, P. serotina, Pyrus coronaria* and *Cornus alternifolia.* We learn from the announcement at the beginning of the volume that these are the finished plates of what was to have been a complete work upon the forest trees of North America. The text was never prepared, and none has been added, and the accompaning nomenclature is such as was in use at the time the plates were executed, and we think that in thus preserving the work in its original shape, those who are responsible for its publication have acted wisely. Had it been completed the work would have been a magnificant one, coveringa large part of the same ground included in Prof. Sargent's Sylva of North America. Mention is made of the preparation of these plates in the preface to Prof. Sargent's work, and it is a matter for sincere congratulation that we now have them, not only on account of their botanical value and handsome appearance, but also for the historical interest attached to them.

A. H.

Poisoning by the So-Called Wild Parsnip—Review of some cases of. F. D. Power. (Pharm. Rundsch. ix. 162-165, illustrated).

The author takes issue with all who claim poisonous qualities for the roots of wild *Pastinaca sativa*, and it is claimed that in all cases investigated where poisoning has resulted from eating parsnip roots, these were shown to belong to *Cicuta maculata.* In every case where the author has known wild *Pastinaca* to be eaten no evil results have followed.

Popular Names of American Plants. Sylvanus Hayward. (Journ. Am. Folk-Lore iv. 147-150).

Populus monticola. (Gard. and For. iv. 330, f. 56.)

Record of Current Literature for 1890. (Ann. Bot. iv. No. xvi).

This entire number is taken up with the above subject. It is divided into two parts. Part i is " Books and Pamphlets," indexed under the authors' names; Part ii is Periodical Literature," indexed geographically.

Rediscovery—An Interesting (Gard. and For. iv. 253, 254).

Account of the finding of *Lonicera flava*, at Paris Mt., S. C., by Mrs. J. G. Smyth.

Red Oak—The (Gard. and For. iv. 337. 338, f. 58).

An illustrated article on *Quercus tnba.*

Report of the Entomologist and Botanist. (Appendix, Rept. Minister of Agric., Ottawa, Can. 154-188, Pl. i-ix).

In the division of Botany there are lists of native and introduced grasses with which experiments have been made, and plates of the following species, taken from the Special Bulletin of the U. S. Dept. Agric.: *Agropyrum glaucum*, var. *occidentale*, *Bouteloua oligostachya*, *Muhlenbergia Mexicana*, *Phalaris arundinacea*, *Poa pratensis*, *P. serotina*, *Lolium perenne*, *Festuca ovina*, and *Bromus secalinus.*

Report of the Mycologist. Roland Thaxter. (Reprint from 14th Ann. Rept. Conn. Agric. Exp. Sta., 1890, illustrated).

The potato "scab" is one of the subjects for description and illustration, now recognized under the genus *Sorosporium.* The "leaf spot" of quince (*Entomosporium maculatum*) is also treated, from an economic standpoint, and there are short notes upon *Phytophthora infestans*, *Cladosporium fulvum*, *Macrosporium Tomato*, *Fusarium Lycoperdici*, *Empusa Grylli*, *Peronospora Cubensis*, *Phytophthora Phaseoli*, *Gymnosporangium globosum*, *Ramularia rufomaculans*, *Uromyces Trifolii*, (to which incorrect reference was made in the last report as *U. striatus*), *Puccinia rubigo-vera*, and *Urocystis occulta.*

Rhododendron Kamtschaticum. (Meehan's Monthly, i. 4. figured).

Rhododendron maximum. (Meehan's Monthly, i. 1, 2, Pl. 1, colored).

Ripe Rot of Grapes and Apples. E. A. Southworth. (Journ. Mycol. vi. 164-173, Pl. xvi).

Illustrated description, history, and bibliography of *Glœosporium fructigenum.*

Rodriguezia anomala. R. A. Rolfe. (Gard. Chron. ix. 728, 729, f. 145).

Description and figure of a new species, native of South Brazil.

Rosa minutifolia. C. R. Orcutt. (West Am. Sci. vii. 181, 182).

Schomburgkia tibicinis. (Gard. Chron. ix. 651, f. 126).

Sophronites grandiflora. (Gard. Chron. ix. 668, f. 127).

Southern Mississippi Floral Notes. Byron D. Halsted. (Gard. and For. iv. 250, 251).

Swamp White Oak—The. (Gard. and For. iv. 241, 242, f. 44).

Terminology of the Spermaphytic Flower—A Suggestion on the. Conway MacMillan. (Bot. Gaz. xvi. 178-179)

Three Month's Course in Botany—The. Conway MacMillan. (Education, xi. 406-411 ; 488-494).

Through San Gorgonia Pass. C. R. Orcutt. (West Am. Sci. vii. 174-177).

Consists of memoranda on the botany of the region.

Toad-Stool Plant—The (Meehan's Monthly, i. 21, illustrated).

Under this heading is an illustrated note on *Scybalium fungiforme.*

Tree Measurements, Made Monthly at San Jorge, Uruguay, from January 12, 1885, *to January* 12, 1890—*Notes on.* Chas. E. Hall. (Trans. and Proc. Bot. Soc. Edin. xviii. 456-468 Pl. v, vi).

A record of the results deduced from careful measurements of some twenty trees during a period of five years, showing relative increase in girth, maximum and minimum months of growth, etc.

Tuberculosis of the Olive. Newton B. Pierce. (Journ. Mycol. vi. 148-153. Pl. xiv, xv.)

Illustrated description of *Bacillus Oleæ.*

Tulip Poplar, or Poplar Tree—The. J. T. Rothrock. (For. Leaves, iii. 85-86, illustrated).

Under this title we have an account of *Liriodendron*, and a picture of three large individuals near West Chester, Penn., known as "The Sisters."

Tuna—The. C. R. Orcutt. (West Am. Sci. vii. 153-157. illus-) trated.

The three species of *Opuntia* known under the name of "Tuna" are here described and figured and their importance as a source of food supply dwelt upon.

Undescribed Plants from Guatemala—IX. John Donnell Smith. (Bot Gaz. xvi. 191-200, Pl. xvi-xviii.)

The following new species are described : *Serjania rufisepala,* Radkl., *S. psilophylla*, Radkl., *S rachiptera*, *Paullinia scarlatina*, Radkl., *Spondias Radlkoferi*, *Galactia discolor*, *Oreopanax oligocarpum*, *Parathesis sessilifolia*, *P. pleurobotryosa*, *Nephradenia fruticosa*, *Solenophora erubescens*, *Heurya imbricans*, *Pisonia aculeata*, L., var. *macranthocarpa*, *Neea psycotrioides*, *Dalechampsia scandens*, L., var. *trisecta*, *Pinus Donnell-Smithii*, Mast., *Fimbristemma calycosa*, *Besleria Pansamalana*, *Macfadyena simplicifolia* the latter three figured.

Vascular Cryptogamia of the Island of St. Vincent – On the. J. G. Baker. (Am. Bot. v. 163-172, Pl. x, xi).

This article consists of a list of the species recently collected by Messrs. H. H. and G. W. Smith, in connection with a committee appointed by the British Association for the Advancement of Science, for a biological exploration of the West Indies. Two new species are figured and described: *Hymenophyllum Vincentinum* and *Asplenium Goldmani*. The whole collection consists of 145 species and varieties. There is also appended a list of 26 species reported from the Island and published in Grisebach's Flora of the British West Indies.

Vegetation of Louisiana and Adjoining Regions, and Its Products, in Relation to Pharmacy and Allied Industries. Carl Mohr. (Pharm. Rundsch. ix. 132-135).

What is Forestry? B. E. Fernow. (Bull. No. 5, Forestry Divn. U. S. Dept. Agric. Pamph. pp. 52, Washington, D. C, 1891).

This in the nature of a circular of information on the subject, containing much of value in small compass.

Wild Flowers Around St. Louis. (Gard and For. iv. 260-261.)

Witch Hazels—The. (Gard. xxxix. 546, 547, illustrated).

Contains a cut of *Hamamelis Virginica*.

Xerophyllums. (Gard. xxxix. 526, 527, Pl. 808, colored and fig. in text).

Xerophyllum asphodelioides is the subject of the colored plate, and a borrowed cut (not credited) from Miss Treat's "Among the Pines," illustrates the habitat of the plant.

Yucca rupicola. J. G. Baker. (Bot. Mag. t. 7172).

Yucca Whipplei. W. F. Parish. (Vick's Mag. xiv. 211, 212, illustrated).

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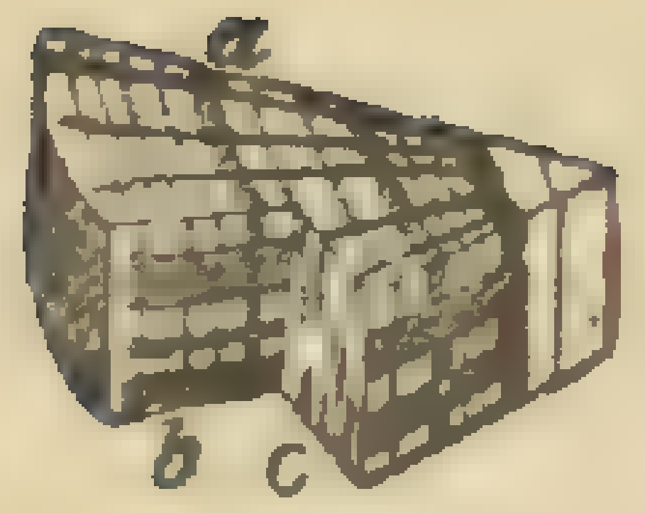

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SMITH ELY JELLIFFE, M.D.

The Club meets regularly at Columbia College, 49th Street and Madison Avenue, New York City, on the second Tuesday and last Wednesday of each month, except July, August and September, at 8 o'clock, P.M. Botanists are cordially invited to attend.

MEMBERS OF THE CLUB will please remit their annual dues for 1891, now payable, to Dr. Wm. E. Wheelock, Treasurer, 26 E. 68th St., New York City.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XVIII.] New York, October 8, 1891. [No. 10.

Concerning some Names for Cucurbitæ.

By E. Lewis Sturtevant.

CUCURBITA.

The ancient Latin name for the gourd, *Lagenaria*. This identification fulfils all the conditions of the context, wherever I have found the word used, and is rendered the more certain by the statement of Albertus Magnus, 13th century, that the cucurbita has white flowers. The earliest figure that I have seen is in the *Herbarium Maguntæ*, 1484. In 1536, under *Cucurbita*, Brunfelsius figures a gourd, and in Mathiolus' Commentaries, 1560, a pumpkin in figured under the name *Cucurbita Indica*.

MELO.

A Latin word which is used by Palladius about 210 A. D. He speaks of *melones* as being sweet and odorous. In the 13th century Albertus Magnus says "melones, quæ alio nomine pepones" vocantur. Hence *Cucumis melo*, L. as also the *Melon* of Crescentius.

The word melon was used for the pumpkin by Lyte, 1578 and 1586, Gerarde, 1597, Parkinson, 1629 and Ray, 1681; apparently by Cartier, 1535, Hariot, 1586, certainly by Kalm, 1770 and Carver, 1776.

MELON.

A Greek word for an apple, or any tree-fruit, as *melon Kudonion*, the quince; *melon Persikon*, the peach. Hence *melopepon*, an apple-shaped pepon.

PEPO.

This Latin word appears in Pliny, about 79 A. D., where he says *cucumeres* when they obtain excessive size are called *pepones*. In the Roman writers on husbandry the word does not occur. In the 3rd century, Apicius Coelius, a writer on cookery, gives like directions for preparing *pepones* and *melones* for eating, i. e., raw, with spices, as does Parkinson in 1629, for the melon, "with salt and pepper (and good store of wine)." In the 9th century Walafridus Strabo, in his Hortulus, speaks of the *pepo* as a round juicy fruit of delicious taste, but his poetry is too discursive to quote. In the 8th century Charlemagne names *peponas* among the vegetables ordered to be cultivated on his estates, but there is no context, yet as the *pepo* in the 9th century was a melon, we may believe *peponas* to be melons. In the 13th century Albertus Magnus describes his *pepo* as a synonym of *melo*, and as a fruit in whose cavity the seeds float without order. The *pepo* of Vergelius, 1532, is a melon. In 1536 Ruellius says the *pepo* and *melopepo* differ but in form and size, the large melons being *pepones*, or *pompons* in the vernacular French, the round melons *melopepones*. In 1539 Stephanus gives *pompon* and *peponam* as the French vernacular for *pepo*, the melon, and describes a fruit whose flesh is softer, smother, and more insipid than the *melopepo :* a remark that would discriminate to-day between our long yellow muskmelon and round nutmeg melon. The *pepo* of Dorstenius, 1540, is a melon, as also of Roslin, 1550, Lonicerus, 1557, Mizaldus, 1560 and 1565, and Scaliger, 1566.

In 1554 Dodonæus calls three forms of the pumpkin: pepones magni, pepones rotundi, pepones lati. Yet the "Melon and Pepon" of Caesalpinus, 1583, is the melon.

PEPON.

A Greek word used as an adjective, signifying ripe, by Herodotus, 443 B. C., Hippocrates, 430 B. C., Xenophon, 401 B. C., Theophrastus, 322 B. C. and Galen, 164 A. D., and apparently by Galen for the melon. The *pepon* of Scaliger in his commentaries on Aristotle and Theophrastus, is a melon. Homer calls the Achaeans *pepones*, weaklings : i. e. soft and tender. According to Porta, 1592, 'Phanias says *pepones* are eaten when the seed is removed, but cucumbers are eaten whole. Speusippus calls the gourd *pepon*.' We note *sikuos pepon* and *pepon* used interchangeably in Aristotle, the *sikuos* being eaten unripe and the *pepon* when ripe. The word is said to be derived from *pesso*, to soften, to ripen.

Pepons was an English name for pumpkins as given by Lyte, 1578 and 1586, also Lobel, 1591. The French *pepom* was used for the melon by Lonicerus, 1557, as already noted: the Italian *pepon* by Camerarius, 1586. In 1786 Duchesne gives *pepon* as the French equivalent for *Cucurbita Pepo*, as does Naudin in recent times, and *pepon* is at present a modern Spanish name for the watermelon. These remarks should come rather under *pepo*, as being derived more probably from the Latin than from the Greek.

According to Sprengel the *pepon* of Theophrastus and the *eteros pepon* of Hippocrates is the watermelon, the *Sikuos pepon* of Hippocrates the melon, and the *pepon* of Dioscorides the pumpkin, but in this latter case he certainly is in error.

MELOPEPO.

This Latin word first appears in Pliny, about 79 A. D., in lib. XIX, c. 23, where he says 'a new form of *cucumer* has lately been produced in Campania, ressembling a quince [in smell ?]. These are called *melopepones*. They are not pendant, but they are round as they lie on the ground. They are remarkable, in addition to their shape, color and smell, that when ripe they separate spontaneously from the stalk.' The modern Christiana melon fulfils all the conditions of this description.

The *melopepo* of Brunfelsius and Ruellius, 1536, Stephanus, 1539 and Dorstenius, 1540, is the melon. In 1550 it was used for the pumpkin by Eucharius Roslin, and for the summer squash by later writers.

MELOPEPON.

A Greek word which does not seem to be synonymous with the Latin *melopepo*. Heyschius, a Greek lexicographer of uncertain date, called the *melopepon*, *sikuos spermapas* or seeding cucumbers, as usually translated, as also does Athenæus about 200 A. D. Galen, about 164 A. D., says the interior flesh of the *melopepon* is eaten, while in the *pepon* it is rejected. If we translate *sikuos spermapas* as a cucumber with seed in the flesh, we would have the watermelon as it popularly might be described. In the Geoponics, a compilation of about 920 A. D., *melopepons* are described as cooling, as quenching thirst in fevers, and it is implied that the fruit is occasionally bitter: remarks that would apply to the watermelon. The relationship to the cucumber, as indicated by the appellation *sikuos spermapas*, finds like expression in the watermelon names of more modern terms, such as citrull cucumber of Lyte, 1578 and Gerarde, 1597; concombre citrin of Dodonæus, 1554, Lobel, 1591, etc., or even a like name with the cucumber, as cocomber, cogombro, and gurchen of Pinaeus, 1561; concombre in Charante, France, as late as 1827, etc.

PUMPKIN.

The first appearance of this word that I detect is in Evelyn's translation of Quintyne, 1693. The pumpkin was called *pepons* and *pompons* by Lyte, 1578; *pompion* by Gerarde, 1597; *pumpion* by Smith, 1614; *pompeon* and *pumpeon* by Worlidge, 1683; *pumkin* and *pumpkin* by Evelyn, 1693; *pompkin* in Miller's Botanicon, 1722. The foreign words of similar derivation are the Belgian *pepoen*, *pompoen*, the French *pepon* and *pompon*, the German *peponen*, the Italian *pepon*, *pepone*, *peponi*, *poponi*, the Swedish *pompa*, *pumpa.*

May not the origination of the word *pumpkin* be from pomekin, a kind of pome? In 1536 Ruellius says Palladius called melons 'melones a malorum figura, quasi pomeos appellant,' which name yet remains. It is more fanciful than correct to suggest the derivation from *pomp*, the radical sense being to swell, to dilate, and *kin* a kind. But historically it is seen that the origin is from *pepo*, *pepon*, *pompon*, words once in use for the melon, and which were transferred, along with modifications, to the pumpkin about 1554.

CITRULLUS.

This word, which appears as *Citrullus vulgaris*, Schrad., *Cucumis citrullus*, Ser. and *Cucurbita citrullus*, L., also appears in the earlier English name for the watermelon as *citrulls*, *cucumber citrulls* and *pome citruls*, and is allied to the *concombre citrin* of the French of 1554, 1578, 1590, etc. The word *citrullus* does not occur in the writers on Roman husbandry, nor in Macer Floridus, nor in the Hortulus of Walafridus Strabo, nor in Andrew's Latin Lexicon. In the 13th century Albertus Magnus says the seeds of *citrulus* are like those of the *cucumis* and *pepo*, and his *pepo* is a melon. Crescentius, of the same century, says, in his edition of 1474, that *citruli* are better when small, tender, green and crisp, and are not as good when they yellow, while *cucumeres* are better as they ripen and become soft and smooth. He speaks of the *melanguli*, which are eaten unripe *like the citrullus* and as being of the same savor. In 1536 Ruellius speaks of *citruli* or *turcicæ*, the same names used later for a pumpkin. In 1539 Stephanus speaks of *citrulus* as having dissected leaves, which implies a watermelon. In 1542 Fuchsius figures the watermelon as *cucumer citrulus*, German *citrullen*, and says the pumpkin is also called *citrulus* from its yellow color, and under the name *citrullus* the watermelon is figured in Ruellius' Dioscorides, 1550, Pinaeus, 1561, Morison, 1681, etc. The *citreolus* of Caesalpinus, 1583, appears to be a cucumber.

In Pliny we find *cerini* named among *cucumeres*, and this is translated *citrini* by Ruellius, 1529. Barbarus, who died in 1493, says *citrini cucumeres* were commonly called *citrioli*, that they were larger than the common kind and not striate. In 1542 Fuchsius says the cucumber is called *cucumer citrinus* because it yellows as it ripens.

In the 3rd century Apicius Cœlius gives directions for preparing *citrini*, *cucumis*, *pepo* and *melo* for eating, all to be eaten raw with spices. In the 12th century Ibn-al-Awam, a Moorish Spaniard, mentions the cucumber of a citrin color. In 1629 Parkinson describes a long yellow cucumber, and in 1747 Rumphius a Chinese cucumber in Amboina which he says is like those called in Italy *citrulli*.

It would hence appear that citrullus in early times was a name for a kind of cucumber or a class of cucumbers; in later times an appellation of the watermelon and pumpkin. The large yellow cucumber of Vilmorin, weighing 3½ lbs., at first pale yellow, then bright yellow when ripe, would seem to answer as the type of the *citrullus* of early writers, as well as any.

The best proof that I have discovered, of the existence of the melon among the Romans, says De Candolle, is a fruit figured very perfectly in the fine mosaics of fruits in the museum of the Vatican. Dr. Comes certifies that a half melon is represented in a drawing at Herculaneum. Hence we find a certainty in the fruit, but a doubt is expressed as to the nomenclature, and here is where I think I have suceeded in throwing some light. The summary of my examinations of the meaning of these words used before the discovery of America are, as probabilities:—

Citrullus = *Cucumis sativus.*
Cucurbita = *Lagenaria vulgaris.*
Melo = *Cucumis melo.*
Melopepo = *Cucumis melo.*
Melopepon = *Citrullus vulgaris.*
Pepo = *Cucumis melo.*
Pepon = *Cucumis melo.*
Pumpkin = modern name for *Cucurbita maxima, Pepo, moschata.*

Sphærella gossypina, n. sp., the perfect Stage of Cercospora gossypina, Cooke.*

By Geo. F. Atkinson.

Plate CXXII.

Several times during the autumn of 1890 I found at Auburn, Ala., specimens of a *Sphærella*, few in number, on leaves of *Gossypium herbaceum.* The leaves also have specimens of *Cercospora gossypina*, Cooke, and I suspected the generic connection of the two, though no special stress was laid upon the coincidence, because the leaves were also badly infected with a variety of other fungi. However, during the following winter in looking over a quantity of cotton leaves sent me by correspondents, I found the same *Sphærella* on leaves from Eutaw and Alberta Station, Ala. The leaves were remarkable for being almost covered with a profuse growth of the *Cercospora* on both sides. The *Sphærella* was also very abundant, and I felt warranted in regarding it, with a good degree of certainty, as the perfect stage of *Cercospora*.

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*Read before the Botanical Club A. A. A. S. Washington meeting, Aug. 20, 1891.

The perithecia are immersed in the tissue of the leaf, the ostiolum and the upper surface projecting through the epidermis. They occur abundantly on either side of the leaf. The sutures of the reticulated surface are quite black, giving a very dark appearance to the perithecia. They measure 60–70 × 65–90 μ.

The asci are subcylindrical, varying to slightly clavate or lanceolate, and measure 8–10 × 40–45 μ. They are eight-spored, though it is difficult without rupturing them to ascertain that number.

The spores are elliptical, or nearly fusoid, and when mature constricted at the septum, one cell being usually somewhat smaller than the other. They are obliquely uniseriate or partly biseriate, and measure 3–4 × 15–18 μ.

In the plate illustrating the article I have included the *Cercospora* stage, the three figures representing variations in the length of the hyphæ and conidia, as determined by different conditions of weather, a warm humid atmosphere, with abundant rains, conducing to a very profuse growth.

All the figures are drawn with aid of the camera lucida to the same scale except the free ascospores, which are a trifle larger.

EXPLANATION OF PLATE.

Sphærella gossypina, Atkinson, n. sp. Figs. 1, 2, 3, different conditions of the *Cercospora* stage. Fig. 4, perithecium with asci escaping ; fig. 5, asci with ascospores ; fig. 6, ascospores.

DEPARTMENT OF BIOLOGY,
ALABAMA POLYTECHNIC INSTITUTE,
AUBURN, ALA., AUG. 6, 1891.

Plants Introduced at Sellsville, near Columbus, O.*

The place has been used by the Sells Brothers as the winter quarters of their circus and menagerie for the past twelve years. All of the list below were discovered since October 1, 1890, by those connected with the University Biological Club.

Those marked with an * are not known to occur elsewhere in the State.

Erodium cicutarium, L'Her ; also at Painesville, Lake Co.
* *Callirrhoe Papaver*, Gray ?

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* Read before the Botanical Club A. A. A. S., Washington meeting, August 22, 1891.

Artemisia annua, L.; has also appeared in nursery at Painesville at various times, but not permanent.

* *Amphiachyris dracunculoides*, Nutt.

* *Aster pauciflorus*, Nutt.

Dysodia chrysanthemoides, Lag.; also found at Westerville, Franklin Co.

* *Gutierezia Texana*, T. & G.

* *Helenium nudiflorum*, Nutt.

* *Helenium tenuifolium*, Nutt.

* *Parthenium Hysterophorus*, L.

* *Solanum rostratum*, Dunal.

* *Monarda citriodora*, Cerv.

Amarantus chlorostachys, Willd.; also Lorain Co.

Amarantus blitoides, Watson; this plant is quite common about Columbus, abundant along the L. S. & M. S. R. R. tracks in Northern Ohio.

Amarantus spinosus, L.; has been growing in other parts of the State for nearly twenty years.

* *Croton capitatus*, Michx.; one plant only.

Chenopodium ambrosioides, L., var. *anthelminticum*, Gray; not rare throughout the State.

* *Avena fatua*, L.

W. R. LAZENBY.

A New Egg-Plant Disease.*

Egg-plants in New Jersey have been seriously troubled with fungous enemies during the past two years. Of these the *Phyllosticta hortorum*, Speg., is perhaps the worst upon the leaves and fruit, causing the former to blight, and the latter to rot prematurely. A species of grey mould, (*Botrytis fascicularis* (Cd.) Sacc), hastens the decay of the mature fruit, and occasionally an Anthracnose, (*Glœosporium melongenæ*, E. and Hals.), seen for the first time last year, is met with. But the greatest complaint has been of the dying of the young plants while still in the hot-bed, or shortly after they are set in the field. The truckers sometimes speak of this trouble as a "damping off," because it is located near the ground, and at this point the young stems decay and break down. During the present year this disease has been under consideration, and its fungous nature established. Specimens of the young plants that have early fallen victims to the fungus show only a cobwebby mass of mycelium upon the diseased parts, and in themselves offered only discouragement to the further study of the trouble. Several hot-beds were visited, and in some cases after the healthy plants had been culled out. It was here that specimens of the trouble were obtained that furnished a clew to the nature of the fungus. These plants showed a dead base to the stem, not more than a third the normal size, and upon the surface were small pimples, slightly darker than the surrounding dry substance. Upon making thin sections and examining the fungus, it proved to be a *Phoma* with many of the pycnidia entirely subterranean, while the others were partly superficial.

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*Read before the Botanical Club of the A. A. A. S., Washington meeting, Aug. 20, 1891.

Three inch pieces of young, healthy stems were sterilized for test tube cultures, and upon these, at first three in number, the *Phoma* was inoculated with a full measure of success in all cases. The treated stems became contracted and covered with the pycnidia of the *Phoma* as in the original. From these in turn other stems were inoculated.

In the meantime the threads from the damped off specimens of another hot-bed had been placed in agar tubes, from which developed the pycnidia. While differing somewhat in shape from those upon the stems, they had the contents of minute spores—hyaline and 3-16 by 2 μ—thus showing that this *Phoma*, (*P. Solani*, Hals.), in its vegetative condition upon young seedlings is one of the so-called damping-off fungi.

BYRON D. HALSTED.

Notes on Some Curious Fungi.*

A curious resinous fungus was found in California on living pine trees, and which Mr. Ellis thought might be *Polyporus officinalis*, Fr. The specimen exhibited was brought to the Agricultural Department by J. Stanley Brown, of the Geological Survey, who had discovered its fungous nature, and wished to have it examined. Some time before a specimen had been discovered on the ground in San Bernardino Co., California, and described as a new mineral, which was named Bernardinite.

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* Read before the Botanical Club, A. A. A. S., Washington meeting, August 22d, 1891.

A fungus very similar to this is sometimes found in the pine woods of Michigan, and is described in Vol. II. of the Journal of Mycology, by W. W. Calkins. The fungus is mostly composed of resin granules formed around knots of mycelium, and containing one or more curiously shaped bodies, sometimes resembling branching bast cells, which are evidently outgrowths of the mycelium. In some places are mycelial strands composed of nearly parallel hyphæ. The pores of the fungus were worn away, only indications of their presence remaining, and no spores could be found; moreover, no authentic specimen was at hand for identification; the real identity of the fungus is, therefore, still an open matter. The method in which the resin was secreted and deposited is also a question for further investigation.

Two other fungi may be briefly noted. One on *Muhlenbergia* appears like an *Erysiphe* with the low power of the microscope, but the conceptacle is crowded full of colorless cells or spores, with thick walls and granular contents. The other is a superficial fungus on bark of orange, and will probably prove to be a new species of the genus *Phymatomosphæria.*

EFFIE A. SOUTHWORTH.

Botanical Notes.

A Double-headed Rudbeckia. Yesterday while gathering a handful of heads of *Rudbeckia hirta* a very unusual specimen was found that seems worthy of passing notice. Instead of a single dark cone with its long fringe of yellow ray-flowers, there were two closely joined upon the same stem, and each was possessed of a full circle of the rays. The heads were so close together that both were equally thrown out of the normal position, one facing the east and the other the west at an angle of about forty-five degrees.

BYRON D. HALSTED.

RUTGERS COLLEGE, June 21st, 1891.

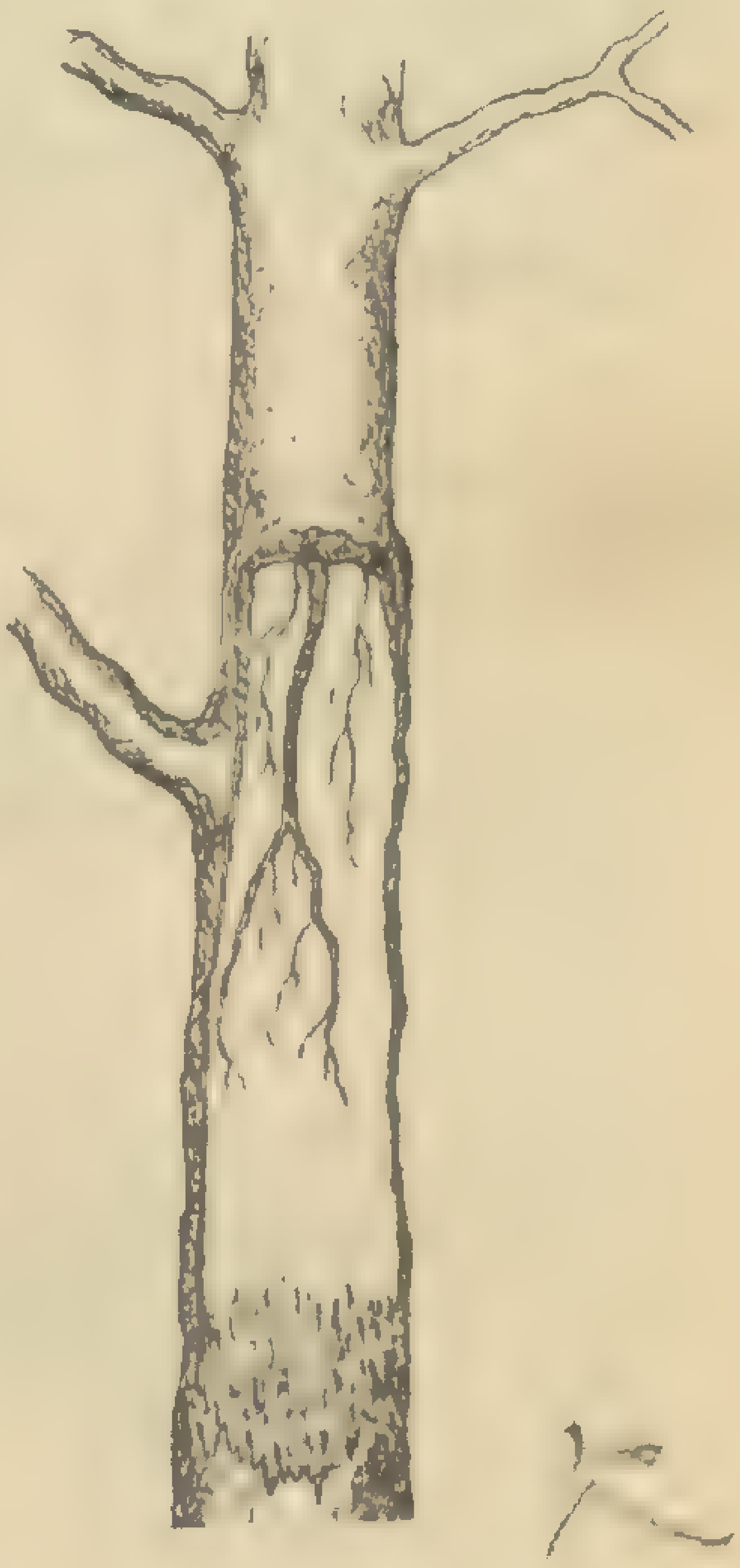
An Economical Maple. In the August BULLETIN, Mr. Sargent has a note on an economical linden that sent roots into a decayed portion of its own trunk. He says he has not noticed this peculiarity in trees of other sorts. Perhaps I can give some additional information on the subject. Last fall my attention was called to this growth in a willow and in a number of swamp maples at Great Neck, L. I. The maple that we examined especially, and of which photographs were taken, had apparently been split and twisted by a storm. One of the roots, at least two inches in diameter, started as high as ten feet above the base of the trunk, and passed down through the decayed portion to the ground. There were all sizes of roots, from this large one to the finest fibers, some reaching the ground, but most branching and spreading through the decayed trunk. Some specimens of the decayed wood filled with small roots and fibers were shown to the Club at the second meeting of last November, and in the spring several of the members visited the locality with me. Since this growth has been found in the linden, the willow, and the maple, trees of such different orders, it seems probable that it may exist in the case of many others that have heretofore escaped observation. LOUISE MERRITT STABLER.

BARNARD COLLEGE, New York.

Another Economical Maple. An interesting case of similar nature to that described by Prof. Sargent in the August number of the BULLETIN is found on a Norway maple in our college grounds. A large branch split off, showing that the splitting had started several years before, that the margins of the trunk had become well callussed, and from several points roots had extended into the cleft, which naturally became partially filled with dust and decaying bark. The largest root was an inch in diameter, divided considerably near the lower end, and was over two feet long.

WM. A. BUCKHOUT.

STATE COLLEGE, Penn.



A New Massachusetts Station for Carex æstivalis, M. A. Curtis. This rare species, so far as I know, has not been reported from Massachusetts since Dewey found it on Saddle

Mountain. I had the good fortune to find a few specimens of it this summer at Stockbridge, Mass. It was growing in rich, damp woods at the foot of Laurel Hill, and about thirty or forty feet from the southeast corner of Williams' Academy. The specimens agree in all respects with Prof. Bailey's description in the Revised Manual, except that the leaves are longer than the culm. CORNELIUS L. SHEAR.

Lespedeza striata (*Thunb.*), *Hook. and Arn.* The statement has been made that this plant was "accidentally introduced with imported goods from China into Charleston, S. C., about the year 1849." It may have been thus introduced there, but I wish to put on record that it was collected by me in August, 1846, in Central Georgia, on the roadside, remote from dwellings, between Monticello and Madison. A specimen, now in the Harvard Herbarium, was sent to Dr. Gray, who did not then recognize it, Since that time it has multiplied exceedingly and spread over the Southern Atlantic States and extended northwestward into Tennessee, Kentucky, and Missouri. In the east it is gradually creeping northward. It was collected in 1878 by Mr. Canby at Eastville on the Eastern Shore of Virginia, and last year by Mr. Hollick near Norfolk, and by Dr. Brinton in Hanover County. This year I found it quite abundant on the Rappahannock above Fredericksburg, so that its arrival on the Potomac near Washington may be soon looked for, if it be not there already.

THOS. C. PORTER.

The California Botanical Club was organized March 7, 1891, with the following officers: President, Dr. H. H. Behr; Vice-President, Mrs. Mary W. Kincaid; Secretary, Frank H. Vaslit; Treasurer, Miss Agnes M. Manning; Librarian, Miss Caroline L. Hunt; Curator, Miss Kate Elliot; Councillors, Mrs. C. E. Hansen, Mrs. M. J. McDonald, Dr. C. M. Blake. The charter roll, closed May 2d, contains ninety-nine signatures—an unusually strong beginning so far as numbers is concerned. The prominence of the gentler sex is an encouraging sign, judging from our own experience. A. H.

Dr. C. F. Millspaugh, Morgantown, W. Va., will issue a preliminary catalogue of the Flora of West Virginia the coming winter; with his own work in the State he is desirous of compiling that of others as fully as possible. Any botanists who have worked in the State, and who will send the Doctor a list of the species they noted there, giving localities, will receive full credit, and six copies of the Flora as a return for the kindness.

Reviews of Foreign Literature.

Monographie du Genre Chrysosplenium. A Franchet. (Nouv. Arch. Mus. Hist. Nat. (III.) ii. 87-114, Pl. III.-VI.; iii. 1-32, Pl. 1-7; reprinted).

In this most beautiful monograph M. Franchet has given a detailed account of the fifty-four species of the genus known up to the present time, and illustrated nearly all of them on the accompanying plates, which are exquisite lithographs. The systematic portion of the work is prefaced by an account of the history of the genus from the time of L'Obel (1576), in whose work is found the first indication of the European plant as "Saxifraga aurea Lichenis facie et natalibus." The genus was first established by Tournefort. The vegetative and reproductive organs are clearly and concisely described, and the geographical distribution remarked upon as mainly Asiatic, five species only occurring in America (*C. alternifolium*, L., *C. Americanum*, Schwein., and *C. glechomifolium*, Nutt., in North America, *C. Valdivicum*, Hook. f., and *C. macranthum*, Hook. f., in Chili and at the Straits of Magellan), while but three species are known in Europe.

The genus divides itself naturally into two sections, Alternifolia and Oppositifolia. Of the first, our only representative is *C. alternifolium*, L., which M. Franchet attributes to Alaska, but which has been found much further to the south and east (Minnesota, fide Watson and Coulter); of the second, the widely distributed eastern *C. Americanum*, Schwein., readily distinguished from the western *C. glechomifolium*, Nutt., by its glabrous seeds, those of *C. Americanum* being covered with white hispid hairs of two kinds—the one very slender, the other thick and clavate, as is capitally shown in M. Franchet's figure.

Three Asiatic species are described as new, while a number of the others have first been made known by the author in his numerous valuable publications on the plants of China and Japan.

N. L. B.

Index to Recent Literature Relating to American Botany.

Abnormal Water-Pore. (Bot. Gaz. xvi. 235, illustrated).

Description of a peculiar water-pore found in a leaf of *Tropæolum majus.*

Against the Using of Revertible Generic Names. Edward L. Greene. (Pittonia, ii. 185-195).

Professor Greene comes out squarely in support of the principle that a name once used is applicable only to the species or genus to which it was originally applied and not to any other. The following genera are taken up: *Xylothermia* in place of *Pickeringia*, Nutt. (1840) of the Leguminosæ, not Nuttall (1834) of the Myrsineæ, now referred to *Ardisia ; Osmaronia* in place of *Nuttallia*, T. & G. (1840) of the Rosaceæ, not Raf. (1818), nor DC. (1821), nor Barton (1823); *Chrysamphora* in place of *Darlingtonia*, Torr. (1853) of the Sarraceniaceæ, not DC. (1825) of the Leguminosæ; *Lilæopsis* in place of *Crantzia*, Nutt. (1818), not Scop. (1777), nor Swartz. (1788), nor Schreb. (1789); *Nemoseris* in place of *Rafinesquia*, Nutt. (1841), not of Raf. (1838); *Tumion*, Raf. (1840) in place of *Torreya*, Arnott (1838), not of Raf. (1818 and 1819), nor of Spreng. (1821), nor of Eaton (1833).

Antiquity of the Last Glacial Period—The. N. S. Shaler. (Proc. Bost. Soc. Nat. Hist. xxv. 258-267).

The author utilizes the computed average rate of diffusion of tree life to calculate the probable time that elapsed since our hickory and walnut trees could have advanced from the southernmost extremity of the great ice sheet to where we now find them. It is assumed that they have advanced on an average over a belt about 400 miles in width, northward from the ancient ice front, and it is calculated, from data available at the present time, that each generation of trees (occupying a period of thirty years) advances about 200 feet by the natural dissemination of the seeds. On this basis it would take 300,000 years to traverse the 400 miles.

This result evidently startled the author and he hastens to say that it is evident the period is altogether excessive, and accounts for the necessary abbreviation of time by the more speedy carriage of seeds by rodents, tornadoes and primitive races of men. In conclusion he says: " Making allowance for the action of these occasional means of dissemination, the impression remains that any such period as ten thousand years is insufficient to account for the northward spread of these slow marching forms. * * The fact * * that they extend in a continuous line from the Atlantic to Minnesota indicates that the advance has been accomplished by causes of a general and continuous nature. It thus seems to me that from the distribution of these large-seeded trees we are led to the conclusion that any such period as ten or even twenty thousand years is totally inadequate to account for the changes which have taken place in the distribution of our forests since the close of the glacial period."

A. H.

Boltonia asteroides. (Meehan's Month. i. 33, 34; pl. iii).

Botanical Club of the A. A. A. S. (Bot. Gaz. xvi. 261-264).

General account of the club meeting, at Washington, Aug. 20, 21, 22, with titles or abstracts of the papers read.

Botanical Papers at the Washington Meeting of the A. A. A. S. (Bot. Gaz. xvi. 255-261).

Titles and abstracts of papers read before Sec. F. and Sec. C.

Botanical Section of the American Association of Agricultural Colleges and Experiment Stations. Washington Meeting. Geo. F. Atkinson. (Bot. Gaz. xvi. 264-267).

General account of the meeting, with abstracts of papers and remarks.

Bromeliaceæ Herbarii Regnelliani. I. Bromeliæ. C. A. M. Lindman. Kong. Svenska Vet. Akad. Handl. xxiv. No. 8, pp. 50, 8 plates).

Description of the species of Bromeliaceæ contained in the herbarium of A. F. Regnell in the botanical museum at Stockholm. The plants are mainly from Brazil, and furnish new species in the genera *Nidularium*, *Karatas*, *Cryptanthus*, *Quesnelia*, *Æchmea*, *Billbergia*, and *Ananas*, besides the two new genera, *Wittrockia* and *Mosenia*. Throughout the work the original authors of species are cited in parentheses.

Calypso—The Home of. F. Blanchard. (Bot. Gaz. xvi. 241, 242).

Description of its occurrence in the cedar swamps of Vermont.

Carices—New California. Notes on Carex. XV. L. H. Bailey. (Reprint, Bull. Calif. Acad. Sci. iii. 104-106).

The following are described as new: *Carex obnupta*, *C. quadrifida*, *C. quadifida*, var. *lenis* and *C. monile*, Tuckm. var. *Pacifica.*

Cereus (*Pilocereus*) *Sargentianus.* C. R. Orcutt. (Gard. and For. iv. 436; f. 69).

Description and representation of a possible new species, heretofore referred to *C. Schottii*, Engelm.

Conifers on Mount Ranier. Chas. V. Piper. (Gard. and For. iv. 382; f. 63).

Tsuga Pattoniana, *Abies lasiocarpa*, *A. nobilis*, *A. amabilis*, *Chamæcyparis Nutkaensis* and *Pinus albicaulis* are noted.

Contributions a la Flore Bryologique du Bresil. V. F. Brotherus. (Acta Soc. Sci. Fennicæ, xix. 30 pp. Helsingfors, 1891, reprinted).

This is an enumeration of the mosses collected by Dr. E. Wainio previous to 1887, with description of twenty-six new species, several of which have been supplied with manuscript names by Dr. C. Müller and three *Sphagnums* described by Herr Warnstorf.

Contributions to American Botany.—XVIII. Sereno Watson. (Proc. Amer. Acad. Arts and Sci. xxvi. 124-163; reprinted).

This paper contains: I. Description of some new North American species, chiefly of the United States, with a revision of the American species of the genus *Erythronium.* The following are described as new: *Arabis Macounii* and *Silene Macounii* from British Columbia; *Erysimum arenicola* from Washington; *Mimulus filicaulis*, *Cladothrix cryptantha*, *Eriogonum minutiflorum* and *E. deserticola* from California; *Zostera Oregana* and *Z. Pacifica* (the latter already described as *Z. marina* var. *latifolia* by Dr. Morong), from the Pacific coast. Thirteen species of *Erythronium* are described, one of them, *E. montanum*, from Oregon and Washington, as new.

II. Descriptions of new Mexican species collected chiefly by Mr. C. G. Pringle in 1889 and 1890. Mr. Pringle's collections still continue to yield Dr. Watson an abundant crop of new species, there being about eighty-eight here characterized, together with two new genera, *Neopringlea* and *Oligonema.*

III. Upon a wild species of *Zea* from Mexico. The discovery of a wild grass closely enough related to Indian corn to be placed in the same genus, is a fact of the greatest interest. The seeds were received by Dr. Watson from Professor A. Duges of Guanajuato, Mexico, and had been reported to him as growing wild at Moro Leon. This corn was planted at the Cambridge Botanic Garden, where it fortunately grew, producing plants over ten feet high. It differs considerably from any form of *Zea Mays* known to Dr. Watson, and he describes it as *Z. canina*, its local name being Mais de Coyote. The natives of the region in which ito ccurs believe that it is the original of the cultivated Indian corn. It is perhaps needless to remark here that up to the present discovery no *Zea Mays*, nor any grass closely resembling it, had been known in the wild condition.

IV. Upon a collection of plants from the Island of Ascention. This is an enumeration of the plants collected on that island by Mr. E. J. Loomis during the visit of the U. S. Eclipse Exploring Expedition of 1889. *Rubus nanus*, *Asplenium Ascentionis* and *Nephrodium* (?) *viscidum* are described as new. N. L. B.

Dacryopsis, Massee—On. (Grevillea, xx. 23–25).

Three species in this recently-erected genus are described from the New World: *D. gyrocephala*, *D. Ellisiana*, and *D. unicolor.*

Descriptions of New Plants, chiefly Gamopetalæ, collected in Mexico by C. G. Pringle. B. L. Robinson. (Proc. Amer. Acad. xxvi. 164–176; reprinted).

New species and varieties are described in the following genera: *Xylosma*, *Desmodium*, *Pimpinella*, *Eupatorium*, *Gymnolomia*, *Otopappus*, *Senecio*, *Laurentia*, *Lobelia*, *Nemacladus*, *Symplocos*, *Gonolobus*, *Buddleia*, *Cordia*, *Heliotropium*, *Omphalodes*, *Ipomoea*, *Bassovia*, *Withania*, *Herpestis*, *Gerardia*, *Castilleia*, *Justicia*, *Citharexylum* and *Scutellaria*.

Descriptions of *Mimulus Congdoni* and *M. gracilipes*, new species from California, and of *Aster Engelmanni*, Gray, var. (?) *paucicapitatus*, from Washington, are appended. N. L. B.

Destruction of California Wild Flowers—The. Chas. H. Shinn. (Gard. and For. iv. 382, 383).

Elisena longipetala. C. G. Van Tubergen, Jr. (Gard. xl. 110, illustrated).

Eucryphea pinnatifolia. (Gard. Chron. x. 217, 218; f. 27).

Eriogynia—A New. Wm. M. Canby. (Bot. Gaz. xvi. 236, 237).

E. Hendersoni is described as new. Collected in the Olympic Mountains, Wash., July 15, 1890, by Prof. L. F. Henderson.

Fasciation in Cnicus lanceolatus. J. W. Toumey. (Bot. Gaz xvi. 236; illustrated).

Flora Brasiliensis. Fasciculus CIX.—Malvaceæ. Carolus Schumann. (Folio, pp. 254–455; pl. 51–80).

Herr Schumann has given, in this part of Brazil's great flora, not alone the species of Malvaceæ occurring in that country, but also monographs of those found throughout South America in the genera *Sida, Abutilon, Gaya* and *Wissadula*, in all of which new species are characterized and new binomials formed by taking up earlier specific names. *Modiolastrum* is a new genus of two species originally described as *Modiolas*, both from Uraguay. Among names which replace some in common use, we note *Malvastrum Coromandelianum* instead of *M. tricuspidatum*, A. Gray, the plant having been originally named *Malva Coromandeliana* by Linnæus and *Sida acuta*, Burm (1768) instead of *S. carpinifolia*, L. (1781).

Flora of Patagonia—Further Contributions to the. John Ball. (Journ. Linn. Soc. xxvii. 471-500).

An annotated enumeration of the plants collected by Mr. William Andrews in Patagonia and presented to the Kew Herbarium in 1888, including ninety-two species, thirty-nine of which had not previously been reported from that country. No new species are described.

Flora of Orono, Me.—A Sketch of the. F. L. Scribner. (Bot. Gaz. 228-234).

Garden Weeds—Names of. Geo. G. Groff. (Am. Gard. xii. 488).

A list of thirty-six common names of weeds of the Eastern United States is given, with their botanical equivalents.

Geo. Thurber. (Ann. Hort. 1890, pp. 291-295, with portrait).

Girdled Trees. (Meehan's Month. i. 37; illustrated).

The general fact is noted that many trees will live for years after complete girdling, and a special instance is the subject of illustration, in which a tree of *Pinus ponderosa* was girdled. The trunk below the girdling had four annual rings, while the part above had eight—showing that it lived four years after the injury and made wood all the time in its upper part, although at a standstill below.

Golondrina Plant—The. C. R. Orcutt. (West Am. Sci. vii. 190-195).

An account of the effect of certain *Euphorbias* as antidotes for snake poisoning.

Grass—A New. Geo. Vasey. (Bot. Gaz. xvi. 235, 236).

Melica (?) *multinervosa* is described as new, collected at Brazos Santiago, Tex., by G. C. Nealley, in 1891.

History of Garden Vegetables—The. E. L. Sturtevant. (Am. Nat. xxv. 694-706).

The plants mentioned in this contribution are *Stachys affinis;* Sugar Beet (*Beta vulgaris*, L.); Sweet Cicely (*Myrrhis odorata*, Scop.); Sweet Majoram (*Origanum*, sp.); Sweet Potato (*Convolvulus batatas*, L.); Tansy (*Tanacetum vulgare*, L.); Tarragon (*Artemisia dracunculus*, L.); Thyme (*Thymus*, sp.); and Tomato (*Lycopersicum*, sp.)

Is Asplenium Marinum Linn. found in America? W. Carruthers. (Journ. Bot. xxix. 251).

According to this note the reported occurrence of this species in America is due to errors of determination, and there appears to be no foundation for considering it an American plant.

Leaf-Bearing Terrane in the Loup Fork—On a. F. W. Cragin. (Am. Geol. viii. 29-32).

Contains lists of the leaves and diatoms found in a lacustrine marl deposit, probably of miocene age, near Alpine, Indian Territory.

Mexican Grasses. F. Lamson-Scribner. (Proc. Acad. Nat. Sci. Philadelphia, 1891, 292–309, Pl. XIII. and woodcuts).

An enumeration of the thirty-six species collected by Mr. Pringle in 1890, with critical notes and descriptions of the following as new: *Hilaria cenchroides*, H. B. K. var. *ciliatus; Muhlenbergia Schaffneri*, Fourn., var. *longiseta; M. articulata; Deschampsia Pringlei; Danthonia Mexicana; Bouteloua stolonifera; Leptochloa Mexicana; Brachypodium pinnatum*, Beauv. var. *cæspitosus.*

This is supplemented by an enumeration of those collected in 1890 by the expedition from the Philadelphia Academy under Prof. Heilprin, nine species, *Bouteloua Americana* and *B. Triæna* being new names.

Mexican Jumping Beans, and the Plant Upon Which They are Produced. C. V. Riley. (Am. Gard. xii. 552-554; illustrated).

The curious seeds known as "jumping beans" are described as the seeds of certain new species of *Sebastiana*, viz.: *S. Palmeri*, Rose, and *S. Pringlei*, Watson, from Mexico. Their peculiar movements, from which the name is derived, are due to the inclusion of the larva of a moth (*Carpocapsa saltitans*) whose motions cause the "jumping" when the beans are slightly warmed by contact with the hand. Similar phenomena are also noted in the seeds of *Colliguaja odorifera* from South America.

Newberry—Prof. John S. (New York Recorder, ii. 10; with portrait).

New or Noteworthy Species. Edward L. Greene. (Pittonia, ii. 167-173; advance sheets).

The following are described as new: *Erigeron multiceps*, from California, (Palmer and Wright, No. 121), *E. coronarius* from Chihuahua, (Pringle, No. 1275), *E. stolonifer*, much of which has been distributed as *E. flagellare*, from Colorado. The genus *Achætogeron* is not considered distinct from *Erigeron*, and its species are all placed in the latter. *Aplopappus Brandegeei*, A. Gray, is also regarded as an *Erigeron*, notwithstanding its yellow flowers, and named *E. aureus*. *Aster Elmeri*, *Arctostaphylos patula*, *A. media*, *Rhododendron Sonomense*, and *Eriogonum elegans*, all from California or Washington, are also here characterized.

Nomenclature—Some Neglected Priorities in Generic. Edward L. Greene. (Pittonia, ii. 173-184, advance sheets).

Professor Greene continues his researches into older generic names than those in common use, and points out that *Jacksonia*, Raf., (1808) antedates *Polanisia* of the same author, (1819), and *Jacksonia*, R. Br., (1811); *Kraunhia*, Raf., (1808), is older than *Wisteria*, Nutt., (1818); *Psilotrophe*, DC., (1838), should replace *Riddellia*, Nutt., (1841), not Raf., (1836); *Agoseris*, Raf., (1817), antedates *Macrorhynchus*, Less., (1832); *Sitilias*, Raf., (1836), has priority over *Pyrrhopappus*, DC., (1838); *Adenostegia*, Benth., (1836), over *Cordylanthus*, Nutt., (1846); *Lappula*, Mœnch., (1794), over *Echinospermum*, Lehm., (1818); *Achroanthes*, Raf., (1808), over *Microstylis*, Eaton, (1822), Lindl. (1829), and *Spathyema*, Raf., (1808), over *Symplocarpus*, Salisb., (1818). The American species are renamed under these older genera.

North American Wood Lilies. (Gard. xl. 222, 223; pl. 821).

Descriptions of *Trillium erythrocarpum*, *T. erectum* and *T. grandiflorum*—the latter the subject of a colored plate.

Northern Pitch Pine—The. (Gard. and For. iv. 397, 398; f. 65).

Illustrated description of *Pinus rigida.*

Notes on North American Mosses.—II. C. R. Barnes. (Bot. Gaz. xvi. 205-207).

Critical notes upon species in the genera *Dicranum*, *Barbula*, *Webera*, *Atrichum*, *Hypnum* (*Thuidium*), *H.* (*Claopodium*), *H.* (*Camptothecium*), *H.* (*Isothecium*), *H.* (*Eurhynchium*). *Hypnum colpophyllum*, Sull., var. *flagelliforme*, is described as new. New localities are given for *Bruchia Hallii*, *Dicranum hyperboreum*, *Coscinodon Raui*, *Fabronia pusilla*, *Myurella Careyana* and *Leskea Austini.*

Oligonema. Sereno Watson. (Bot. Gaz. xvi. 267).

The author states that he finds it necessary to change the generic name *Oligonema*, recently erected by him, on account of having learned that there is a genus of the same name in the Myxomycetes which has priority. The name *Golionema* is proposed instead.

Our Native Plants.—III. (Vick's Mag. xiv. 243, 244, illustrated).

Contains a figure of *Calla palustris.*

Papaw—The. E. S. Carman. (Am. Gard. xii. 533, 534; illustrated).

General description of *Asimina triloba.*

Pinus cembroides. (Gard. and For. iv. 352, f. 59).

Poa annua—Note sur l'organogenie de. L. Durand. (Bull. Mens. Soc. Linn. Paris, i. 961, 962).

Podocarpus nubigena. (Gard. Chron. x. 171; f. 23).

Pollination of Helianthus—Notes on the. Walter H. Evans. (Bot. Gaz. xvi. 234, 235).

Pyrularia oleifera. (Am. Gard. xii. 576; illustrated).

Report of the Botanical Branch, 1890. Jas. Fletcher, R. B. Whyte, W. Scott. (Ottawa Nat. v. 80-84).

Contains memoranda upon important finds, a list of sixteen additions to the "Flora Ottawaensis," and a list of the species of *Sphagnum* found near Ottawa.

Revision des Fissidentacées de la Guadeloupe et de la Martinique. Emil Bescherelle. (Rev. Bryol. 18^e^ Année, 49-55).

Sarcomyces—New Genus. G. Massee. (Grevillea, xx. 13, 14).

S. vinosa, on wood, Venezuela and South Carolina, is described.

Soulard Crab and Its Kin—The. L. H. Bailey. (Am. Gard. xii. 469-474, illustrated).

This is an account of a supposed accidental hybrid between *Pyrus coronaria* and the common apple, which is recognized as *P. Soulardi.* Figures of fruit, flower and leaf are given. *P. Ioensis* is described as a new species and figured, quoted as identical with *P. coronaria,* var. *Ioensis,* Wood.

Southern California Notes. C. R. Orcutt. (Gard. and For. iv. 351).

Papaver Californica and *Phacelia Orcuttiana* are noted as occurring immediately after regions have been burned over, seeming to be veritable "fire-plants." *Lathyrus splendens* and *Dicentra chrysantha* seem to be benefited by the advent of fire, and *Calochortus Weedii* often appears spontaneously in abundance over burnt districts.

Systematic Botany—The Future of. John M. Coulter. (Bot. Gaz. xvi. 243-254).

This is the text of the address of Vice-President Coulter before Sec. F., at the Washington meeting of the A. A. A. S.

Uredineæ—Notes on. J. C. Arthur. (Bot. Gaz. xvi. 225-227).

Three new species are described: *Puccinia medusæoides, P. Cyperi,* and *Uromyces Gentianæ,* and notes upon other species given.

Wild Columbine—The. Henry L. Clarke. (Vick's Mag. xiv. 286-288; illustrated).

Account and representation of *Aquilegia Canadensis.*

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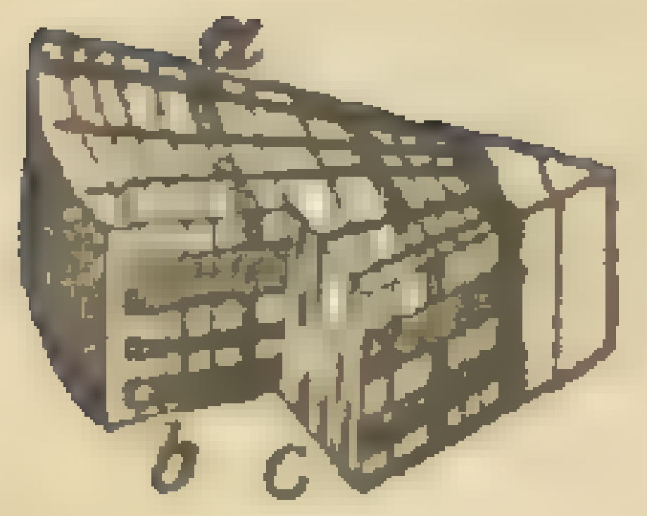

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MEMBERS OF THE CLUB will please remit their annual dues for 1891, now payable, to Dr. Wm. E. Wheelock, Treasurer, 26 E. 68th St., New York City.

BULLETIN
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Botany of the Marysville Buttes.

By Willis L. Jepson.

Almost in the center of the Sacramento Valley and on the level plain between the two great forks of the Sacramento River, the upper Sacramento and the Feather, lie the Marysville Buttes. Entirely isolated from either the Sierra Nevada or the Coast Range, rising abruptly on every side to a considerable elevation from the level plains, these mountains with their ragged summits and sharp slopes form a striking landmark visible from nearly every portion of the northern Sacramento Valley.

I made my way to the Buttes by means of a river steamer. The banks of the stream were fringed with a dense growth of box elder, oak, willow, cottonwood and sycamore, with a thick undergrowth of *Rubus*, *Vitis*, *Sambucus* and *Baccharis*. An occasional break revealed the extensive tule swamps bordering the river for miles, all aglow with great patches of *Cotula*. It was as yet too early to expect much along the river banks and bottoms in the way of annual growths, the winter freshets having only lately receded. But on the plains around Yuba City there was plenty of vegetation and the flora appeared little different from that of the valley sixty miles below; the characteristic spring plants were there in abundance, lupines, clovers, larkspurs, buttercups, *Brodiæas*, *Tritelias*, *Layias*, *Eschscholtzias*, *Allocaryas* and *Orthocarpi*. But the moment I reached the Buttes the flora to all appearances changed entirely.

However, I must not risk generalizations; the vegetable riches of that region are too little known. I spent only one day in Sutter County and barely four hours at the Buttes; but in that time some one hundred and ten species fell into my hands, at least three of which were undescribed. No botanist has to my knowledge ever made a collection to illustrate even partially the flora of this peculiarly isolated compact group of hills. The water expedition of the Wilkes party from San Francisco, of which Dr. Pickering was plant collector, ascended the Sacramento River in August, 1841, and "passed the Prairie Buttes, which are a collection of isolated hills rising from the level plain as if out of the sea." The land expedition of the same party from Oregon encamped at nightfall "after an ineffectual search for water..... in the valley or 'kraal' of the Buttes" and left the next morning. This was October, the dryest season of the year. From this point, Butte Pass, they call it now, I climbed to the summit of the South Peak, nearly two thousand feet above the level of the valley, and two thousand one hundred and twenty-eight above the sea.

The Buttes have at a distance a very barren appearance, and they are in fact but little wooded. The annual growth was, however, everywhere luxuriant, even to the summits of the highest rocky points. The sides of the little cañon which I entered were clothed with dwarfed oak trees, rhamnus and holly bushes and undershrubs. Over the tops of the oaks and other trees clambered the clematis, lighting the whole cañon side with its wonderful profusion of blossoms.

As to whether the affinities of the flora are with the Coast Range or Sierra Nevada can only be determined by more extensive and protracted collecting. My time was perforce too short, and many of the very common things were neglected. Widely introduced plants and native species of extensive geographical range one would naturally expect to find here. About the old settlements on the Feather River, *Marrubium vulgare* grew rankly; on the Sutter Plains *Capsella bursa-pastoris*, *Silene Gallica*, *Achyrachæna mollis*, *Sonchus oleraceus*, were frequent; and at the Buttes, *Sanicula Menziesii*, *Micropus Californicus*, *Rigiopappus leptocladus*, *Hypochæris glabra*, *Malacothrix obtusa*, *Githopsis specularioides*, *Salvia Columbariæ* and *Plantago Pata-*

gonica. A less hasty survey would have undoubtedly yielded more similar plants.

I give below a list of the major portion of the plants of which I obtained specimens, even of many very well known species. My excuse for so doing must be that the flora of this region has been hitherto almost unknown, that nearly one-third of the list have their geographical range extended as given in the State Survey volumes on botany, that many novel and interesting forms were obtained, and that several others have here their second known station recorded.

The collection from the Sutter plains and the Buttes was made on April 20, 1891; that from the Feather River on the day previous.

Clematis lasiantha, Nutt. in Torr. and Gray, Fl. i. 9.

Up to about 900 ft.

Ranunculus Eiseni, Kellogg, Proc. Calif. Acad. vii. 115.

Sufficiently distinguished from *R. Californicus* by its smaller size, hairiness, cuneiform segments of the three-parted radical leaves, and fewer (commonly five) petals. Sutter plains.

Ranunculus hebecarpus, H. and A. Bot. Beechey, 316.

Lower cañon sides, South Peak.

Delphinium variegatum, Torr. and Gray, Fl. i. 32.

Sutter plains.

Delphinium decorum, F. and M. 3rd Ind. Sem. Petr.

Wooded cañons, South Peak.

BERBERIS DICTYOTA. Erect, only six inches high: leaflets commonly five, sometimes only three or four, not crowded, coriaceous, ovate with undulate margins and spinose teeth, one to two and one-fourth inches long, pale green below, bright shining green above, very strongly reticulated on both faces: racemes terminal, clustered, 9-12 lines long: fruit unknown.

The mark of this species as compared with *B. pinnata,* which it mostly resembles, is in its few, coriaceous and strongly reticulated leaflets. These, with the rigid acuminate teeth and undulate margins, give the plant a very spiny appearance. Only one specimen seen and that near the rocky summit of South Peak.

Platystemon Californicus, Benth. Trans. Hort. Soc. 2 ser. i. 405.

Sutter plains. What is probably a dwarfed form only four to six inches high, with erect habit, radical tuft of leaves, and pods never more than one or two seeded, was found at 1500 ft. on South Peak.

Eschscholtzia crocea, Benth. Trans. Hort. Soc. n. ser. i. 406.

The most widely distributed and showy flowered Eschscholtzia of the interior parts of California, and which is common in cultivation as *E. Californica*, is not the plant of Chamisso. The true *E. Californica* belongs to the sand dunes and coast hills of San Francisco and Monterey, and that is where the botanists of the Russian expedition obtained it. The one of the Sacramento and San Joaquin Valleys, which I am now considering, is without doubt the *E. crocea* of Bentham. They are both perennial, but *E. crocea* is different in size, habit, hue of foliage, and color of flowers. Its chief marks are the large size of the orange corolla; the conspicuously spreading scarious torus rim; and the long-conical calyptra, as distinguished from that of *E. Californica*, which is oval and abruptly short-pointed. My specimens from the Buttes agree perfectly with the figure in the Botanical Register, t. 1677.

Eschscholtzia tenuifolia, Hook. Bot. Mag. t. 4812, not of Benth.

Peduncle quadrangular; pod peculiar in the prominence of the ribs. In fruit; only a few of the pale yellow flowers lingering. Willow Branch.

Eschscholtzia hypecoides, Benth. Trans. Hort. Soc. n. ser. i. 407.

A good species and very easily distinguished from the foregoing. That has the leaves all radical, seldom more than half the length of the numerous quadrangular scapes, finely and often sparingly cut into linear divisions; corolla 3-5 lines long, yellow; capsule curved, seeds strongly muricate. This is more strictly erect with terete stems usually simple or 2-3 branched from the base; radical leaves fewer, somewhat leafy stemmed, all mostly twice pinnately cleft or parted into broader divisions, general outline broadly ovate, calyptra ovate-acuminate; petals orange, seven lines long; young capsule straight, mature fruit unknown.

At about 1600 ft. on South Peak.

Erysimum asperum, DC. Syst. ii. 405.

Near the summit of South Peak.

Nasturtium lyratum, Nutt. in T. and G. Fl. i. 73.

Strictly erect; leaves 2-4 inches long, oblong or obovate, irregularly toothed, or with sinuate divisions; silique 6-7 lines long, linear, ob-compressed, on pedicels a line long or less. Doubtfully referred here. A long series of specimens from all parts of the state is needed to define satisfactorily the limits of the species. Star Bend, Feather River; Yuba City.

Tropidocarpum gracile, Hook. Ic. Pl. t. 43.

Valley of the Butte Pass.

Lepidium Menziesii, DC. Syst. ii. 539.

Butte Pass.

Thyanocarpus elegans, F. and M. Ind. Sem. Hort. Petr. p. 51.

Pod four to five lines in diameter. Near the foot of South Peak.

Stellaria nitens, Nutt. in T. and G. Fl. i. 185.

Arenaria Douglasii, (Fenzl.) T. and G. Fl. i. 179.

On South Peak. Not before known north of Auburn and Sonoma.

Arenaria Californica, Brewer in Boland. Catal. 6.

Half-way up South Peak, on a soil composed of triturated sandstone.

Claytonia perfoliata, Donn, in Willd. Sp. ii. 1186.

Foot of South Peak.

Malva parviflora, Linn. Amœn. Acad iii. 416.

Butte Pass, in waste places.

Geranium Carolinianum, Linn. Sp. Pl. ii. 682.

Erodium Botrys, Bertoloni, Amœn. Ital. 35.

Willow Branch.

Rhamnus tomentella, Benth. Pl. Hartw. 303.

Acer Californicum, (T. and G.) Dietr. Syn. ii. 1283.

Recorded only from the Coast Range, along the Feather and Sacramento Rivers.

Cercis occidentalis, Torr. in Gray, Pl. Lindh. 177.

Reduced to a scraggy stiff-stemmed bush. Summit of South Peak.

Vicia Americana, Muhl. in Willd. Sp. iii, 1096.

Astragalus tener, (H. and A.) Gray, Proc. Am. Acad. vi. 206.

Near Yuba City.

Lotus Wrangelianus, F. and M. Ind. Sem. Petr. 16.

Base of South Peak.

Lotus nudiflorus, (Nutt.) Greene, Pitt. ii. 141.

The quadrate seeds with a rather marked notch. Not previously known north of Mt. Diablo; low hills, Butte Pass.

Trifolium gracilentum, Torr. and Gray, Fl. i. 316.

Sutter City.

Trifolium ciliolatum, (Nutt.) Benth. Pl. Hartw. 304.

Sutter City.

Trifolium columbinum, Greene, Pitt. i. 4.

A depauperate form. Sutter plains.

Trifolium variegatum, Nutt. in T. and G. Fl. i. 317.

Base of South Peak.

TRIFOLIUM TRILOBATUM. Annual, a span high, branched from the base and glabrous throughout; lower leaflets finely serrate or occasionally with coarsely toothed summits; upper leaves on peduncles one to two inches long; leaflets spinulose serrate, cuspidate, narrowly rhombic, often abruptly contracted above the middle, and even becoming three lobed; stipules nearly orbicular, with setaceous teeth, but not deeply cleft; involucre irregularly incised with spinulose divisions; calyx tube nearly a line long, with setaceous purple teeth a line and a half long; corolla four to seven lines long, purple with white-tipped banner.

The flowers are large for the slender habit of the plant, which grew in quite a mass by the side of a mountain brook at the base of South Peak.

Trifolium Watsoni, Loja. Giorn. Ital. xv. 186.

Hardly typical. Base of South Peak.

Trifolium microcephalum, Pursh, Fl. ii. 478.

Yuba City.

Trifolium fucatum, Lindl. Bot. Reg. t. 1883.

Sutter plains.

Lupinus micranthus, Dougl. in Bot. Reg. t. 1251.

Lupinus affinis, Agardh, Syn. 20.

Yuba City.

Lupinus albifrons, Benth. in Lindl. Bot. Reg. t. 1642.

Only formerly known from the vicinity of San Francisco and southward. South Peak, 1500 ft.

Lupinus microcarpus, Sims, Bot. Mag. t. 2413.

Sutter City.

Lupinus densiflorus, Benth Trans. Hort. Soc. n. ser. i. 409.

The yellow flowered form. Sutter plains.

Heteromeles arbutifolia, (Ait. f.), M. J. Rœmer, Syn. Monog. iii. 105.

The Buttes.

Rubus vitifolius, Ch. and Schl. in Linnæa, ii. 10.

Harding's Landing. Along the Feather and Sacramento Rivers.

Saxifraga Californica, Greene. Pitt. i. 286.

The Buttes.

Tellima affinis, (Gray) Boland. Catal. 11.

Wooded cañon sides, South Peak.

Tellima scabrella, Greene, Pitt. ii. 162.

Base of South Peak.

Sedum pumilum, Benth. Pl. Hartw. 310.

Gravelly hillside, Willow Branch.

Œnothera strigulosa, (F. and M.) Torr. and Gray. Fl. i. 512.

South Peak.

Œnothera graciliflora, H. and A. Bot. Beechey. 341.

South Peak.

Mentzelia pectinata, Kellogg, Proc. Calif. Acad. iii. 40.

I had described this Mentzelia as new when fortunately my attention was called to a species published twenty-three years ago by Dr. Kellogg. The description is fairly satisfactory and the figure agrees in nearly all respects. The leaves in my plant are not 3-nerved, but strongly 1-nerved. The figure hardly shows the petals as obcordate, although they are so described. The petals in my plant are obcordate, the distinct mucronation showing under a simple lens as a hairy cusp. The stems are dark with a glandular pubescence; leaves hispid. The beauty of the corolla appealed to Dr. Kellogg as always, for he describes it with minuteness: "flowers of a shining golden color, with a lustrous metallic hue, shading from a deep vivid orange to a burnt carmine center."

On the southern exposure of South Peak at about 1600 ft.—quite plentiful. Most nearly allied to *M. Lindleyi*, but the corolla not nearly so large and the shape of the petals different; the straight capsule only half as broad. My specimens were in good flower and showed no trace of losing the dark glandular indument of the stems. It is a pecularity of the related Californian species that they are of that shining whiteness which gave *M. albicaulis* its name. I have not much doubt that my plant is that of Kellogg. His specimens were from "mountains above Visalia." In any event it seems strange that the species should have been so long ignored in books on Californian botany.

Galium Nuttallii, Gray, Pl. Wright. 80.

Cañons near Butte Pass.

Galium asperrimum, Gray, Pl. Fendl. 60.

Leaves of my specimens uniformly in whorls of five, upper oblanceolate, lower spatulate, all abruptly cuspidate: young fruit densely hispid.

Valerianella congesta, Lindl. Bot. Reg. t. 1094.

Hillsides near South Peak.

Aplopappus linearifolius, DC. Prodr. v. 349.

Never before credited to any portion of California north of Mt. Diablo. At 1500 ft. on South Peak.

ERIGERON CALIFORNICUS. Near *E. divergens* but perennial, branched from the base, ascending, 6-10 inches high, cinereously hirsutulous, leafy up to the base of the peduncles of the scattered heads; radical leaves pinnately parted into five linear segments; cauline narrowly oblanceolate, entire, acutish; heads two or three lines high; rays about 60-75, not very narrow, purplish; pappus of ray and disk alike, of conspicuous squamellæ and very few (four or five) bristles.

Though near *E. divergens*, this is clearly distinguishable by its perennial habit, pinnate radical leaves, and fewer broader rays. On the very edge of the summit of South Peak.

Baccharis viminea, DC. Prodr. v. 400.

Nicolaus, Feather River. The most northern station yet recorded.

Gnaphalium Sprengelii, H. and A. Bot. Beechey, 150.

The Buttes.

Layia platyglossa, Gray, Pl. Fendl. 103.

The Buttes.

Layia Fremontii, Gray, Pl. Fendl. 103.

Sutter plains.

Wyethia helenioides, Nutt. Journ. Philad. Acad. vii. 38.

Hills, Butte Pass. Common around the Bay of San Francisco.

Bæria gracilis, Gray, Proc. Am. Acad. ix. 196.

The paleæ of the pappus too broad to be typical; attenuate into an awn which is not entire. Very likely a new species, but the material too young to determine satisfactorily its position. Low hills near South Peak.

Bæria Fremontii, Gray, l. c.

Base of South Peak.

*AGOSERIS HETEROPHYLLA (Nutt.). *Macrorhynchus heterophyllus*, Nutt. Trans. Am. Phil. Soc. vii. 430.

Low hills near South Peak.

AGOSERIS MAJOR. *Troximon elatum*, Greene, Pitt. i. 71.

Near the preceding but separated on account of its much larger size and expanded head thrice as broad; brownish, not whitish pappus. The name *elatum* is preoccupied by a species of Nuttall under Troximon.

Phlox gracilis, (Hook.) Greene, Pitt. i. 141.

South Peak.

Gilia pusilla, Benth. Bot. Reg. fol. 1622.

South Peak.

Gilia dichotoma, Benth. in DC Prodr. ix. 314.

At about 1500 ft. Also in Butte Pass.

Gilia ciliata, Benth. Pl. Hartw. 325.

Sides of South Peak.

Gilia achilleæfolia, Benth. Bot. Reg. fol. 1622.

The calyx far less tomentose than in the forms around San Francisco Bay. Butte Pass.

Gilia tricolor, Benth. l. c.

Butte Pass.

**Agoseris*, Raf. Fl. Ludov. 58 (1817) is the earliest name for this genus, the species of which have latterly been referred to *Troximon*.

Nemophila insignis, Dougl. in Benth. Trans. Hort. Soc. n. ser. i. 479.

Valley of the Butte Pass.

Nemophila parviflora, Dougl. in Benth. Trans. Linn. Soc. xvii. 275.

Lower cañon sides, South Peak.

Phacelia tanacetifolia, Benth. in Lindl. Bot. Reg. t. 1696.

Butte Pass.

Amsinckia intermedia, F. and M. Ind. 2. Sem. Petr. 1835. p. 26.

Growing four feet high in the fields and often crowding out all other vegetation. Sutter plains.

Allocarya stipitata, Greene, Pitt. i. 19.

Sutter plains.

Plagiobothrys canescens, Benth. Pl. Hartw. 326.

Low hills. Another plant from 1600 ft. has an erect habit, is only six inches high,. and much smaller and narrower fruiting calyx, as distinguished from the other, which has the usual trailing habit and broad flat calyx. I am, however, unable to discern the slightest difference in the nutlets.

Cryptanthe flaccida, (Lehm.) Greene, Pitt. i. 15.

The Buttes.

Solanum umbelliferum, Esch. Mem. Acad. Petrop. x. 281.

An entirely glabrous form marked by its strict habit, paucity of foliage, and rather small pale flowers. On South Peak.

Collinsia bicolor, Benth. Bot. Reg. 1734.

Butte Pass.

Pentstemon corymbosus, Benth. in DC. Prodr. x. 593.

Near the summit of South Peak.

Mimulus guttatus, DC. Cat. Hort. Monsp. 127.

The Sutter plains.

Castilleia parviflora, Bongard, Veg. Sitcha. 158.

On South Peak.

Orthocarpus attenuatus, Gray, Pac. R. Rep. iv. 121.

Low hills near Butte Pass.

Orthocarpus purpurascens, Benth. Scroph. Ind. 13.

Abundant in Butte Pass and frequent on the Sutter plains.

Chenopodium Californicum, Wats. Bot. Calif. ii. 48.

The Buttes.

Umbellularia Californica, Nutt. Sylv. i. 87.
South Peak.

Salix lasiolepis, Benth. Pl. Hartw. 335.
Butte Pass.

Populus Fremontii, Watson, Proc. Am. Acad. x. 350.
Mahon's Landing, Feather River.

Quercus Wislizenii, ADC. Prodr. xvi^2. 67.
Lower slopes of South Peak.

Quercus dumosa, Nutt. Sylva. i. 7

At about 1000 ft. This is an oak of southern rather than northern California. It has been found as far north in the Coast Range as the vicinity of Clear Lake.

Aristolochia Californica, Torr. Pac. R. Rep. iv. 128.
Summit of South Peak.

Tritelia ixioides (Ait. f.), Greene, Bull. Cal. Acad. ii. 42.
On the slopes of South Peak.

Tritelia laxa, Benth. Trans. Hort. Soc. n. ser. i. 423. t. 15.
Sutter City and the Buttes.

Brodiæa capitata, Benth. Pl. Hartw. 339.
Butte Pass.

On the Citing of Ancient Botanical Authors.

By N. L. Britton.

My review of Professor Greene's "Flora Franciscana" (BULLETIN, this volume, pp. 158-160), has been made by him the text of a most scholarly paper in the recent pages of his "Pittonia." His explanations, arguments and criticisms of my remarks are most skillfully drawn, and it is with a feeling that I have but little chance to win in the friendly dispute that I again essay to break a lance with him. However, it is perhaps desirable that I should have another word before my position shall have been rendered entirely untenable.

I have not accused my friend of originality in attributing generic names to the ancient Greeks and Romans. I am well aware of the truth of his statement, that he has not "entered upon course of procedure which has not been taken by learned and famous botanists at one time and another within the last century," even so lately as Baron F. von Mueller's "Second Systematic

Census of Australian Plants," published in the year of grace 1890; and it has been my fortune to meet during the past summer a scholar who must be freely accorded the distinction of being quite as shrewd in perception and as accurate in judgment as any who have preceded him, who holds to the same opinions.

I am led to write this, because Professor Greene has thought it desirable to disclaim the origination of the views he advocates and to refer to what we have had so recently and satisfactorily defined as "authority."

I will first consider his criticisms on my remarks. He takes exception to my statement that "Generic names used by pre-Linnæan authors and adopted by Linnæus are credited to the old writers even as far back as Dioscorides and Pliny," saying that it is true only under important limitations, and showing that he has adopted only those which have been satisfactorily identified. By this I understand him to imply those which he considers to have been satisfactorily identified. Thus he attributes *Cercis* to Linnæus because "the most eminent critics of ancient botany failed to identify *Kerkis;*" and again, "*Lotus* is credited to Tournefort because the ancients had several Loti." And yet my sentence is I think actually true, for I did not say, nor intend to say, that "All generic names used by pre-Linnæan authors and adopted;" etc. But we will not quibble over a word. I might better have said, "many generic names, etc.," and will credit him with a point of vantage.

But I think that he has here touched on a very weak place in his armament, and one that I did not allude to in my review because I realized that I was approaching dangerous ground, and recognized the necessity of keeping some things in reserve. The point that I would make is the undisputed uncertainty of identification of a very large number of ancient names. Not all ancient names, but a great many. There is no preservation of the plants of Dioscorides, Theophrastus or Pliny. Some of them can be known from description, some from ancient engravings, some of them can not be known at all, and between the knowable and the unknowable there is a hazy region which each critical student will interpret differently. Now how in the world are we to attain stability under the system advocated by Prof. Greene, while such conditions exist? *Per contra*, if we begin to reckon genera from some author, all, or very nearly all, of whose genera may be known by the preserved types, we at once dispel the preceding haze and remove at once a very grave difficulty.

My friend next considers my statement that "The ancients did not use the names in the generic sense of Tournefort, Linnæus and others of about their time, but, in most cases at least, as mere appellations for plants." Inasmuch as he admits "the impossibility that the ancients should have applied names in the generic sense of any generation of modern botanists," the only fact which I wished to emphasize by this sentence, it is hardly worth while to dwell on it longer. There is nothing in it to imply that they never applied names as generic. But his remarks open up the very broad field of research into the history of the evolution of Systematic Botany, which he is so admirably equipped to discuss, and about the details of which I am so ignorant. For, like everything else in the universe, the science has been produced by little and little. I suppose that primitive man, being brought as intimately as he was into contact with the vegetable kingdom, early came to know such plants as were useful to him for food and clothing, and must have had names for them which were transmitted—doubtless with many modifications—from generation to generation. As the faculties of perception became developed, it became evident that there were relationships among the plants, and by a closer and closer study of these relationships the knowledge of the subject has increased to the present. Theophrastus, Pliny and Dioscorides have, I know, been called the "Fathers of Botany," and in its broad sense the title is well given, but to my mind they are very far from being the Fathers of Systematic Botany. But if we consider other branches of human knowledge we find that it has not been found possible to push practical procedure therein back to anything like their beginnings. It has been found necessary to establish by common consent "statutes of limitation," beyond which inquiry and speculation very freely go, but beyond which practical knowledge cannot be reached, and I believe it necessary in our science to establish a statute of limitations at a practical, available point, and this point I believe to be where the writings of some author who proposed a complete system by means of which plants could be grouped, and whose conclusions may be verified and have been verified by examination of the materials on which his results were based. To the statements that "few or any of the names are likely to be older than the Latin or Greek languages in whose vocabularies they are found," I must therefore take decided exception.

A point of departure such as I have indicated, being then in my opinion a necessity of the case, it will be seen that if my views are to be maintained, this must be found at the writings of either Tournefort or Linnæus, the systems they established being complete in the light of the information they possessed, and their genera practically every one recognizable from their books or herbaria, and even should the latter be destroyed, the knowledge of their genera is so widely diffused that there would never be any uncertainty about them. Tournefort's system is a generation older than that of Linnæus, and if there were no other circumstances to be considered, would have overwhelming claim to the distinction. But there is a very grave difficulty in adopting it, and one which I believe will ever render it unavailable. It is this: It is of the very highest degree of importance that the two sciences of botany and zoology should go hand in hand, and the zoologists can never go back to Tournefort, because he established no animal genera. The versatile Linnæus, however, brought together all Natural History in his Systema Naturæ. He was familiar with plants, animals and minerals. I doubt if it can be satisfactorily maintained that he was more botanist than zoologist. He must have known the whole range of nature better than any other man of whom we have any record. The collections which he brought together were actually immense for his time, and his library was of the richest character. Besides all this, he certainly established the binomial system of nomenclature, and its general acceptance dates from his time, no matter what authors may have used it before. Tournefort did not use it at all, so we cannot go to him for species, another consideration which with me is a strong argument against going to him for genera. And so, as I said in my review of my friend's work, it seems better to me not to go back of Linnæus.

An Enumeration of the Plants collected by Dr. H. H. Rusby in South America, 1885-1886.—XVIII.

(Continued from page 264.)

COMPOSITÆ.

Sparganophorus Vaillantii, Gærtn. Fruct. ii. 396. Falls of Madeira, Brazil (1628).

Vernonia coriacea, Lessing, Linnæa, 1831, 661. Reis, 1,500 ft. (1588).

Vernonia pycnantha, Benth. Yungas, 6,000 ft. (1728). The same as Hartweg, Peru, 754.

Vernonia simplex, Lessing, Linnæa, 1829, 280. Sorata, 13,000 ft. (2669).

Vernonia scabra, Pers. Ench. ii. 404. Reis, 1,500 ft. (1589).

Vernonia mollis, H.B.K. Yungas, 6.000 ft. (1658). The same as Lechler's Peru, 2351.

Vernonia scorpioides, Pers. Ench. ii. 404. Yungas, 6,000 ft. (1704).

VERNONIA SENECIONÆFOLIA, spec. nov. Fruticosa, ramosa, ramulis teretibus plus minusve pubescentibus; foliis petiolatis (petiolus 8–12 mm. longus), ovalis 8–12 cm. longis, utrinque glabris viridibusque, ad apicem acuminatis, basi acutis, margine remote denticulata; capitula pauca, campanulata, multiflora, regulariter corymboso-paniculata, 15–20 mm. lata; involucri squamæ persistentes, 6–8 seriatæ, interiores ligulatæ obtusæ, exteriores breviores, lanceolatæ, acutæ; pappus uniserialis, setis albidisom, minute scabris.

Yungas, 6,000 ft. (1730). Plant with much the aspect of a *Senecio*.

Vernonia laurifolia, DC. Prodr. v. 30 (?). Yungas, 4,000 ft. (1617). Agrees well with the description. I have not seen a named specimen of the species.

Vernonia arborescens, Sw. var. CUNEIFOLIA, var. nov. Folia ad basim cuneata. Reis, 1,500 ft. (2148), apparently differing from the wide-spread tropical American species only in the cuneate bases of the leaves.

VERNONIA BAKERANA, spec. nov. Fruticosa, alte ramosa, dense et minute tomentosa; foliis petiolatis, lanceolatis, utriusque

attenuatis, integris, supra glabris, valde viridibus, subtus dense albo-pubescentibus, 5-7 cm. longis, 10-15 mm. latis; capitulis copiose scorpiodo-paniculatis, sessilibus, late campanulatis, 5-6 mm. latis, 3-4 mm. longis; involucri squamis 4-5 seriatis, interioribus lanceolatis, acutis, exterioribus subulatis; pappi albidi, setis interioribus exteriores 5-6-plo superantibus.

Yungas, 6,000 ft. (2147).

VERNONIA ARISTOSQUAMOSA, spec. nov. Fruticosa, ramosa, ramis teretibus pubescentibus; foliis sessilibus, lanceolatis, coriaceis, integris, acuminatis, 3-6 cm. longis, 10-12 mm. latis, supra glabris, subtus sparse pubescentibus; capitulis sessilibus campanulatis multifloris, 10-15 mm. latis, 10-12 mm. longis, bracteatis, laxe scorpiodo-paniculatis; involucri squamis 4-5-seriatis, exterioribus subulatis, longe aristatis, interioribus lanceolatis, mucronatis; pappi fusci, setis interioribus exteriores 5-6-plo superantibus; acheniis dense pubescentibus.

Yungas, 6,000 ft. (1657). Near *V. muricata*, DC. and *V. aurea*, Mart.

VERNONIA YUNGASENSIS, spec. nov. Fruticosa, ramosa, ramis dense puberulentis; petiolis 10-15 mm. longis; foliis ovatis vel ovato-lanceolatis, denticulatis, longe acuminatis, ad basim rotundatis, supra scabridis, subtus reticulatis, dense griseo-pubescentibus; capitulis campanulatis 6-7 mm. latis, copiose sub-scorpioideo-paniculatis; involulucri squamis 3-4 seriatis, ovatis vel interioribus lanceolatis, obtusis, pubescentibus; pappi albidi setis exterioribus brevissimis, acheniis striatis, glabratis.

Yungas, 4,000 ft. (1731; 1732).

VERNONIA BOLIVIANA, spec. nov. Fruticosa, copiose ramosa, ramis angulatis, glabris; petiolis 6-12 mm. longis; foliis ovatis, coriaceis, utrinque glabris, nitidis viridibusque, integris, acuminatis, ad basim rotundatis, integris, 8-12 cm. longis, 4-5 cm. latis; capitulis campanulatis, paucifloris, copiose sub-scorpioideo-paniculatis; involucri squamis 2-3 seriatis, ovato-oblongis, obtusis, glabris; pappi albidi, setis uniserialibus 3 mm. longis; acheniis striatis.

Yungas, 4,000 ft. (1729). Related to Spruce's No. 4865 from Tarapoto, Peru.

Elephantopus tomentosus, L. Sp. Pl. 814 (*E. mollis*, H.B.K.)
Mapiri, 5,000 ft (1105); Yungas, 6,000 ft. (1106).

Elephantopus angustifolius, Sw. Prodr. 115. Guanai, 2,000 ft. (1591).

Elephantopus spicatus, B. Juss. in Aubl. Guian. 808. Mapiri, 5,000 ft. (1109).

Adenostemma triangulare, DC. Prodr. v. 113. Mapiri, 5,000 ft. (1673).

Ageratum conyzoides, L. Sp. Pl. 1175. Mapiri, 5,000 ft. (1643).

Stevia Boliviensis, Sch. Bip. Bull. Soc. Bot. France, xii. 81, name only. Yungas, 4,000 ft. (1614); Unduavi, 8,000 ft. (1615). The same as Mandon's 242, Herb. Kew.

Stevia compacta, Benth. Pl. Hartw. 191. Near La Paz, 11,000 ft. (1613).

Eupatorium squalidum, DC. Prodr. v. 142. Mapiri, 5,000 ft. (1622).

Eupatorium conyzoides, Vahl., Symb. iii. 96. Sorata, 8,000 ft. (1624); Guanai, 2,000 ft. (1621).

Eupatorium conyzoides, Vahl. var. *incanum*, Baker in Mart. Fl. Bras. vi. Pars. II. 278 (*E. Clematitis*, DC. var. *tomentosum*, Sch. Bip. Bull. Soc. Bot. France, xii. 81, name only). Yungas, 4,000 ft. (1625); Sorata, 8,000 ft. (1626).

Eupatorium scabrum, L. f. Suppl. 354. Guanai, 2,000 ft. (1623).

Eupatorium extensum, Gardn. in Hook. Lond. Journ. Bot. vi. 440, ex descr. Guanai, 2,000 ft. (1627).

Eupatorium iresinoides, H.B.K. Nov. Gen. iv. 106, t. 340. Near La Paz, 10,000 ft. (1637).

EUPATORIUM GUANAIENSE, spec. nov. § Osmia. Suffruticosum, erectum, 5-7 dm. altum, ramosum; caule ramisque pilosis; foliis sessilibus, lanceolatis, acutis vel acuminatis, coriaceis, integris, trinervis, utrinque viridis, supra scabris, subtus hispidis; capitulis cylindrico-campanulatis, 8-10 mm. longis, multifloris; squamis 3-4 seriatis, linearibus, obtusis vel truncatis, glabris, trinervis; pappi setis griseis; acheniis 2 mm. longis, linearibus, costatis, glabris.

Guanai, 2,000 ft. (1735). Related to *E. verbenaceum*, Mart.

Eupatorium Vauthierianum, DC. Prodr. v. 159. Beni River (2126).

Eupatorium Guadalupense, Spreng. Syst. Veg. iii. 414. Yungas, 6,000 ft. (1609); Guanai, 2,000 ft. (1603; 1606). Same as Holton's 319, New Granada.

Eupatorium steviæfolium, DC. Prodr. v. 158. Junction of the rivers Beni and Madre de Dios (1656).

Eupatorium Sternbergianum, DC. Prodr. v. 167. Yungas, 6,000 ft. (1608); Guanai, 2,000 ft. (2719). The same as Mandon's 252, so determined by Schultz.

Eupatorium kleinioides, H.B.K. Nov. Gen. iv. 120. Guanai, 2,000 ft. (1734).

Eupatorium macrophyllum, L. Sp. Pl. 1175. Yungas, 6,000 ft. (1610); Mapiri, 2,500 ft. (2125); junction of the rivers Beni and Madre de Dios (1605) (*E. populifolium*, Mart).

Eupatorium inulæfolium, H.B.K. Nov. Gen. iv. 109. Yungas, 4,000 ft. (1607).

Eupatorium glomeratum, DC. Prodr. v. 154. Yungas, 4,000 ft. Same as Mandon's 256.

EUPATORIUM RUSBYI, spec. nov. § Conoclinium. Suffruticosum, erectum, ramis pubescentibus; foliis oppositis, ovato-lanceolatis, acuminatis, in petiolum late marginatum attenuatis, utrinque viridis et scabro-pubescentibus, membranaceis, acute dentatis, 10-15 cm. longis, 3-4 cm. latis; capitulis numerosis pedicellatis corymboso-paniculatis, campanulatis, multifloris, 5-6 mm. latis; involucri squamis linearibus, obtusis; pappi setis albis, tenuibus; involucro hemispherico, nudo, papilloso.

Mapiri, 2,500 ft. (2723).

Eupatorium amygdalinum, Lam. Encycl. ii. 408. Yungas, 4,000 ft. (1635); 6,000 ft. (1636).

Eupatorium glechonophyllum, Less. Linnæa, 1831, 105. Near Valparaiso, Chili (1604).

Eupatorium Salvia, Colla. Pl. Chil. 8, f. 2. Near Valparaiso, Chili (2514).

Eupatorium heptanthum, Sch. Bip. Bull. Soc. Bot. France, xii. 82, name only. Near La Paz, 10,000 ft. (1733). The same as Mandon's 260. Closely related to if not identical with *E. Azangaroense*, Sch. Bip., based on Lechler's No. 1776 from Peru.

Eupatorium hecatanthum (DC.), Baker in Mart. Fl. Bras. vi., Pars. ii. 365. Yungas, 6,000 ft. (2127). The same as Mandon's 262, so determined by Schultz, but differing somewhat from Baker's description.

Notes on New England Marine Algæ. V.

BY FRANK S. COLLINS.

Pleurocapsa fuliginosa, Hauck. This species I have found at Marblehead, Mass., forming a very thin reddish or brownish-black coating on rocks near high water mark; probably it is to be found at similar stations elsewhere, as it occurs in most parts of Europe. The cells, which are from .005 to .02 mm. diam., are usually reddish-brown, but sometimes golden-brown or dull violet; they are often united in twos, fours, or larger numbers, due to the repeated cell division in all directions; when the cells cease to divide, the contents change into small round spores. The species is described and figured in Hauck, Deutschlands Meeresalgen, p. 515, fig. 231.

Dermocarpa Schousbœi (Thuret) Bornet. This species I have found at Nahant, Mass., growing on *Rhodochorton Rothii* and *Rhizoclonium riparium;* it is likely to be found also on other filamentous algæ. The genus *Dermocarpa* differs from *Pleurocapsa* in that the cells of the former do not divide, and therefore are not found united in twos, fours, etc., but though often closely packed, remain individually distinct, each attached to the host plant. In *D. Schousbœi* they are spherical or flattened by mutual compression, and the color is light bluish-green. Figured and described, as *Xenococcus Schousbœi*, in Bornet and Thuret, Notes Algologiques, p. 73, Tab. xxvi.

Dermocarpa prasina (Reinsch) Bornet. Grows quite abundantly in spring on the New England coast, on the older part of the fronds of *Polysiphonia fastigiata*. It is easily distinguished from the preceding species, the cells being cylindrical or club-shaped, .015-.03 × .005-.02 mm., of a deep blue-green color. They are closely packed, forming cushion-like expansions. Reinsch described and figured in Contributiones ad Algologiam et Fungologiam, a number of species of *Sphænosiphon*, a genus which must give place to the older *Dermocarpa;* most of his species it would be practically impossible to distinguish. I do not think our plant can be separated from *D. prasina*, which occurs commonly in Europe on *Catenella opuntia*, and is figured and described in Bornet and Thuret, Notes Algologiques, p. 73, Tab. xxvi.

Goniotrichum ramosum (Thwaites) Hauck. This differs from *G. elegans* (Chauvin) Zan., by having cells which are green in color and longer than broad, instead of reddish, and as long as broad or shorter; they measure .005-.008 × .008-.02 mm. I I found it at Quincy, Mass., in small quantity among other algæ. Described in Hauck, Meeresalgen Deutschlands, p. 519.

Calothrix Contarenii (Zan.) Born. and Fl. The filaments of this species considerably resemble those of *C. scopulorum*, but they are thinner and straighter, and so erect and closely packed as to resemble those of an *Isactis*. The surface of the frond also resembles *Isactis*, being dark green and smooth, thus easily distinguishing it from *C. pulvinata*, which is equally densely packed, but has a spongy surface. I have found it at Revere Beach, Mass., growing in January and February a little above low water mark, on stones more or less imbedded in the sand.

Calothrix æruginea (Kütz.) Thuret. A species considerably resembling *C. crustacea* in color and habit, but smaller (filaments .009-.01, rarely .012 mm. diam.) and with fewer heterocysts. I found it at Cape Rosier, Maine, July, 1890, growing sparingly on fronds of *Enteromorpha*, *Cladophora*, etc., in a warm upper tide pool. Figured and described in Bornet and Thuret, Notes Algologiques p. 157, Tab. xxxvii.

Calothrix fasciculata, Ag. The chief distinguishing character of this species is the branching, which in mature plants takes the form of more or less dense, usually secund tufts, near the end of the filaments. I found it at Cape Rosier, Maine, in July, 1889, growing on rocks between tide marks.

Enteromorpha micrococca, Kütz. A small species, externally resembling a stunted form of *E. intestinalis*, but microscopically distinguished by irregularly placed, very small cells (.004-.005 mm. diam.), arranged in no particular order, and by the relatively thick (.018-.02 mm.) cell wall. I found the plant at Mount Desert Island, Maine, in July, 1890, growing on exposed rocks near high water mark, in places where fresh water was running down. It is figured and described in Kützing, Tabulæ Phycologicæ, vol. vi, p. 11, Tab. xxx.

Ulothrix implexa, Kütz. In making collections in the rather brackish water of the Mystic River, at Medford, Mass., in

May, 1887, I found the woodwork of the wharves covered with a coating of algæ, which when examined under the microscope consisted of a bewildering confusion of forms; all of which, however, could be placed under the known species of our coast except one, which I venture to identify as above, on the faith of the description and figure in Hauck, Deutschlands Meeresalgen, fig. 193, and a specimen from the Adriatic, which I owe to Dr. Hauck. The plant is characterised by the rather thin cell wall, the cells rather shorter than their diameter, which is .01-.014 mm., and by the more or less distinct chlorophyll ring in each cell. The color is a yellowish green. I have since found the same species growing near high water mark, on rocky shores at Marblehead and Nahant.

Halothrix lumbricalis (Kütz.) Reinke. I first found this plant at Cohasset, Mass., in May, 1885; it grew in company with *Castagnea*, *Punctaria*, and other spring algæ, on floating leaves of *Zostera marina*. Two or three years later I found it similarly at Revere Beach, Mass., and this spring, 1891, I have found it at the latter locality, growing luxuriantly and abundantly on the *Zostera* which grows near low water mark; it has also been found at Bridgeport, Conn., by Mr. Isaac Holden. It forms a dense fringe, from 3 mm. to 2 cm. in height, and is often hidden from casual observation by other and larger algæ growing with it. The species was first figured and described by Kützing as *Ectocarpus lumbricalis*, the fructification having some external resemblance to that of the subgenus *Pylaiella* of *Ectocarpus*; Hauck transferred it to *Elachista*, which it resembles in its unbranched sterile filaments; Reinke has recently created a new genus for it, as a result of his studies of its structure and development, which he has published in Algenflora der Westlichen Ostsee, Deutsches Antheils, p. 49. He has given very complete figures in the Atlas Deutscher Meesesalgen, Tab. I.

Ectocarpus Mitchellæ, Harv. This species was described and figured by Harvey in the first part of the Nereis Boreali-Americana, published in 1852. His specimens were collected by Miss A. Mitchell of Nantucket, for whom he named it; since that time nothing had been heard of it, and the species was beginning to be regarded as rather apocryphal. Among some algæ recently sent me by Miss Laura Jernegan of Edgartown, Mass., I found an *Ectocarpus*, collected by her at Edgartown, which I have little doubt belongs to the long lost species. It is a delicate plant, considerably resembling in color and habit *E. confervoides*, var. *siliculosus*, but the branching is more patent, especially at the tips, where the ramuli are quite densely set, something like *E. fasciculatus*, except that in *E. Mitchellæ* they are more divaricate. The plurilocular sporangia are quite distinct from any other of our species, being elliptic oblong or almost cylindrical, quite sessile, and obtuse, arranged in series on the upper side of the branches. It is, however, not improbable that it may be identical with *E. virescens*, Thuret; but in that case Thuret's name would have to give way to Harvey's, which has the priority. *E. Sandrianus*, Zan., is nearly allied, but as far as I can judge from figures and herbarium specimens, the two are distinct.

Pylaiella littoralis (L.) Kjellm., var. *fluviatilis*, Hauck. The species is very common and variable, but I have only once met with this variety, which I found in a ditch in Mystic River marshes, Mass. It is softer and more delicate than the type, and is characterized by the very long plurilocular sporangia, little if any wider than the branches on which they grow. In my specimens they sometimes reach a length of a millimeter, and are often terminal, in that case reminding one of *Ectocarpus confervoides*. It is not impossible that *E. longifructus*, Harv. may be properly referred to this variety.

Ascocyclus globosus, Reinke. The genus *Ascocyclus* has been separated by Magnus from *Myrionema*, on account of the formation of the sporangia from the terminal cells of the upright filaments or from their branches, while in *Myrionema* they are borne directly on the basal layer. In *A. globosus* they are formed by transformation of the branches. Colorless jointed hairs, rather larger than the upright filaments, are distributed among the latter, rising from the basal layer. This is one of the larger species of the genus, and forms hemispherical or spherical tufts, large enough to be visible to the naked eye, on various filiform algæ. I have found it at Nahant, Mass., on old fronds of *Chætomorpha Melagonium*. Described in Reinke, Algenflora, etc., p. 46, and figured in the Atlas, Tab. xvii.

Ascocyclus Balticus, Reinke. This species I have found growing on the tips of the fronds of *Laminaria digitata*, at Marblehead, Mass. It is a smaller species than the preceding, forming dots about the size of those of *Myrionema*. The basal layer produces colorless hairs, and erect simple filaments, the upper cells of which are transformed into sporangia, the lower cells remaining unchanged. Described in Reinke, Algenflora, p. 45, and figured in the Atlas, Tab. xv.

Beside the two species just mentioned, the genus *Ascocyclus* will contain one other American species, *A. orbicularis* (J. Ag.) Magnus, (*Myrionema orbiculare*, J. Ag.)

Elachista lubrica, Rupr. Our common *Elachista*, *E. fucicola* (Velley) Fries, varies considerably in appearance, especially on the coast of Maine, where it occurs not only on a number of different species of algæ, but also on woodwork; in July, 1888, I found at St. George's Bay, Maine, an *Elachista* growing rather plentifully on *Halosaccion ramentaceum*, the usual habitat of *E. lubrica*. Dr. F. R. Kjellman, to whom I submitted the various forms of this genus which I had collected, does not consider the plant on *Halosaccion* distinct from our common species, but pronounces a form growing on *Polysiphonia fastigiata* to be the true, arctic *E. lubrica*. It is somewhat softer and paler than *E. fucicola*, and the free filaments are abruptly wedge-shaped at the base, somewhat tapering to the apex; the cells in the basal part one-half to one-third their diameter; the unilocular sporangia longer and narrower than in *E. fucicola*.

Elachista stellaris, var. *Chordæ*, Aresch. A small plant, hardly visible to the naked eye, which I have found once only, when it grew on *Stilophora rhizodes*, collected at Falmouth Mass., in September. The type, which is considerably larger, has not yet been found here, but should be looked for on *Arthrocladia villosa*, on which it occurs in Europe. The variety is sufficiently distinguished from any other of our species by its small size, filaments largest near the base and tapering to the apex, and by the ellipsoid-pyriform sporangia. Figured and described in Areschong, Observationes, Part III. p. 18. Tab. II.

Phuyllophora Traillii, Holmes. This minute species grows on exposed rocky shores, in clefts and "runways" in the rocks.

The fronds seldom reach a height of 15 millimeters, and consist of a terete stipe, sometimes forking, and ending in a rather narrow lamina, simple or once divided; along the margins of the lamina are often numerous ciliæ, in which the cystocarps are formed, usually in the winter months. The color is a bright red, and the fronds usually grow in rather dense patches. I have found it from Cohasset, Mass., to Penobscot Bay, Maine. It is figured and described in Batters' List of the Marine Algæ of Berwick-on-Tweed, p. 114, Tab. xi.

Gymnogongrus Griffithsiæ (Turn.) Martius. I found this plant in September, 1886, forming densely matted tufts scarcely two centimeters high on small pebbles just below low water mark, in an arm of the sea known as the "Salt Pond", Eastham, Mass. It grew in company with *Gelidium crinale*, which it considerably resembles in habit, though easily distinguished on closer examination by its irregular branching. The nemathecia were abundant, forming small wart-like swellings on the branches, mostly at the axils.

In addition to the above mentioned, which I have myself found, the two following species have been found by Dr. W. A. Setchell.

Entocladia Wittrockii, Wille, a plant consisting of slender, irregularly branching green filaments, living in the cell walls of various filamentous algæ, which are more or less distorted by it. The cells are about .009 mm. diam., the end cells slenderer and quite long. Zoospores are formed in single, more or less swollen cells. Dr. Setchell has found it at several points on the coast, and it is probably not uncommon. Figured in Hauck, Deutschlands Meeresalgen, fig. 199.

Pringsheimia scutata, Reinke, a curious green alga forming disk-like expansions on algæ, etc., reminding one somewhat of the fresh water genus *Coleochæte*. The resemblance, however, is merely superficial, the elaborate sexual fructification of *Coleochæte* being entirely wanting, reproduction taking place either by non-copulating macrozoospores, or by copulating microzoospores, the two forms being produced on separate plants. It is described in Reinke, Algenflora, etc., p. 81, and figured in the

Atlas, Tab. xxv., and was found by Dr. Setchell at Waquoit Bay, Mass., on *Zostera marina*.

The above mentioned species and varities, with the exception of *Ectocarpus Mitchellæ*, have never, so far as I know, been reported from the American coast; and as the published descriptions are almost in all foreign languages, and in works not generally accessible, I have added comments which I hope will enable students to recognize them. In the Flora of Middlesex County, Mass., by L. L. Dame and F. S. Collins, I mentioned two other species new to this country, *Monostroma Vahlii*, J. Ag., and *M. latissimum* (Kütz.) Wittr. The locality where the former was found having been destroyed, it is to be hoped some other will be found for it; the latter seems to be not uncommon in marshes near Boston, and has also been found at Bridgeport, Conn., by Mr Isaac Holden. In both places it seems to pass into *M. quaternarium* (Kütz.) Desm.; possibly the two are not distinct species.

Some Plants of Western Pennsylvania.

By Adolph Koenig, M.D.

The following named plants were observed in flower during a halfday's botanical excursion in a narrow valley and adjacent hill-sides, near Wildwood, on the Pittsburg and Western R. R., about fourteen miles north of Pittsburg, July 2nd, 1891.

Anemone Pennsylvanica, L. Rare.
Anemone Virginiana, L. Rather common.
Thalictrum polygamum, Muhl. Common.
Ranunculus acris, L. Common.
Cimicifuga racemosa, (L.) Nutt. Very abundant.
Nasturtium palustre (L.) DC. Apparently the typical form. In waste ground.
Brassica nigra (L.) Koch. Common.
Barbarea vulgaris, R. Br. Common.
Brassica campestris, L. In neglected fields.
Viola sagittata, Ait. Not rare. Inflorescence cleistogamous.
Lychnis Githago (L.) Lam. One specimen only. In open woods, near railroad.
Stellaria longifolia, Muhl. Common.

Hypericum perforatum, L. Common.

Impatiens aurea, Muhl. Just coming into flower. Common.

Ceanothus Americanus, L. Very plentiful.

Medicago lupulina, L. Along the railroad. Not rare.

Spiræa Aruncus, L. Almost past flowering. Common.

Physocarpus opulifolius (L.) Maxim. Mostly in fruit. Not rare.

Gillenia trifoliata (L.) Mœnch. Rather common.

Rubus odoratus, L. Common.

Rubus villosus, Ait. Very common.

Rubus hispidus, L. Rare in this county.

Geum album, Gmelin. Common.

Potentilla Norvegica, L. Common.

Rosa humilis, Marsh., var. *lucida* (Ehrh.) Best. Common.

Heuchera Americana, L. Mostly in fruit. Common.

Hydrangea arborescens, L. Common.

Œnothera fruticosa, L. Common.

Heracleum lanatum, Michx. Not rare. Mostly in fruit.

Cryptotænia Canadensis (L.) DC. Very common.

Cicuta maculata, L. Common.

Cornus sericea, L. Common.

Erigeron annuus (L.) Pers. Common.

Erigeron ramosus (Walt.) B.S.P. Common.

Heliopsis helianthoides (L.) B.S.P. Common.

Rudbeckia hirta, L. Common.

Cacalia reniformis, Muhl. Rather common.

Hieracium venosum, L. Common.

Lactuca Canadensis, L. Common.

Valerianella radiata, Dufr. Not common. Mostly in fruit.

Lobelia spicata, Lam. Very abundant in fields and open woods.

Kalmia latifolia, L. Almost out of flower. Abundant.

Lysimachia quadrifolia, L. Very common.

Steironema ciliatum (L.) Raf. Rather common.

Apocynum androsæmifolium, L. Less common that cannabinum.

Asclepias Syriaca, L. Common.

Asclepias incarnata, L. Common.

Asclepias exaltata (L.) Muhl. Less common.

Myosotis laxa, Lehm. Not common, but abundant in a dense bed in one locality at this station.

Convolvulus sepium, L. Common.
Verbascum Thapsus, L. Common.
Verbascum Blattaria, L. Common.
Scrophularia nodosa, L., var. *Marilandica* (L.) Gray. Common.
Penstemon lævigatus, Solander, var. *Digitalis* (Nutt.) Gray. Rather rare.
Veronica officinalis, L. Common.
Leonurus Cardiaca, L. Common.
Dianthera Americana, L. Common.
Blephilia ciliata (L.) Raf. Common.
Euphorbia corollata, L. Common.
Sisyrinchium anceps, Cav. Common.
Dioscorea villosa, L. Common.
Lilium Canadense, L. Not rare in this locality, but rare elsewhere.
Stenanthium robustum, Watson. Rare; the only station known to the writer. Not quite in flower.
Tradescantia Virginica, L. Common in this locality but not elsewhere in the county.
Smilax rotundifolia, L. Common.
Polygonatum commutatum (Schult.) Dietrich. Mostly in fruit. Not very common.
Sparganium androcladum (Engelm.) Morong. Common.

In addition to these the following species were also observed, not, however, in flower. They are of interest because of their comparative rarity in this neighborhood.

Arisæma Dracontium (L.) Schott. Very rare.
Rhus copallina, L. Rare, but plentiful at this station.
Acer spicatum, Lam. Rare.
Taxus Canadensis, Willd. Rare in this county.
Humulus Lupulus, L. Well established along the creek and its tributaries.

July 9th, the following species were seen in flower in the same locality:

Hieracium scabrum, Michx. Less common than venosum.
Pyrola rotundifolia, L. Not rare.
Galium pilosum, Ait. Not very common.
Monarda didyma, L. Not rare.
Waldsteinia fragarioides (Michx.) Tratt. Not common.

Chimaphila maculata (L.) Pursh. Not rare.
Stachys palustris, L. Not common.
Blephilia hirsuta (Pursh.) Benth. Not rare.
Œnothera biennis, L. Very common.
Mimulus alatus, Ait. Not rare.
Rhus glabra, L. Common.
Hypericum prolificum, L. Just coming into flower. Not common.
Phryma Leptostachya, L. Rather common.
Circæa Lutetiana, L. Common.
Pycnanthemum incanum, Michx. Not rare; just coming into flower.
Campanula Americana, L. Common.
Asclepias tuberosa, L. Rare.
Penthorum sedoides, L. Common.
Silphium trifoliatum, L. Rare.

Reviews of Foreign Literature.

Iconographia Floræ Japonicæ or Descriptions with Figures of Plants Indigenous to Japan. By Ryokichi Yatabe (Vol. 1. Part 1. 66 pp., large 8vo. 20 Plates, Tokyo, 1891).

This work, of which we have here the pleasure of announcing the first part, is the most important contribution yet made to the knowledge of Japansese plants. The author states in his prefatory note: "As there exists no book containing the figures and descriptions of all the plants known to be indigenous to Japan, I intend, in the following pages, to supply this want. Although some friends of mine have promised their contributions, it will, nevertheless, require a number of years to complete the work. The specimens to be figured will be chiefly obtained from the Botanic Garden and Herbarium of the Imperial University, and will include both Phanerogamic and Cryptogamic plants. The figures will serve, moreover, as illustrations to a compendious flora of Japan for the use of students, which I am now preparing." The descriptions are given in detail in both English and Japanese. The illustrations are beautiful outline drawings, showing the habit of the plants, and their floral and fruit structure. Many of the species recently first described in the Bulletin of the Tokyo's Botanical Society are here figured. N. L. B.

Index to Recent Literature Relating to American Botany.

Address on the Fungous Diseases of Plants, Delivered at the 16th Annual Meeting of the East Tennessee Farmers' Convention, held at Knoxville, May 19th and 20th, 1891. F. Lamson-Scribner. (Pamph. pp. 31, Nashville, 1891).

Aster Shortii. (Gar. and For. iv. 472, 473, f. 74).

Biolettia—A new Genus of Compositæ. Edward L. Greene, (Pittonia, ii. 215, 216).

Description of a new genus with one species, *B. riparia*, from banks of the lower San Joaquin River, Cal. The plant has the aspect of an *Erigeron*, but the fruit characters of the Helenioidæ. It is dedicated to the discoverer, Mr. F. T. Bioletti.

Bocconia. H. H. Rusby. (Reprint from Bull. Pharm., Aug., 1891).

The author describes the discovery of the medical properties of the genus. *B. cordata*, *B. frutescens* and *B. arborea* are figured.

Botanical Nomenclature—A New Departure in. Edward L. Greene. (Pittonia, ii. 213-215).

Argument against the use of specific names identical with generic.

Bulletin No. 23, *Kansas State Agricultural College. Botanical Department.* W. A. Kellerman. (Pamph. 8vo. pp. 10, three Plates).

This Bulletin is concerned with the smuts of sorghum and corn. *Ustilago Sorghi* and *U. Reiliana* are subjects of illustration.

Chia. Edward Palmer. (Zoë, ii. 140-142).

The title of this paper is the term used to denote the meal prepared in Mexico from the seeds of several species of *Salvia*.

Cola Nut or Bissy. (Bull. Bot. Dept. Jamaica, No. 23).

Describes the economic value of *Cola acuminata*.

Common Shrubs of Southwest Colorado—The. Alice Eastwood. Zoë, ii. 102-104).

Contributions to the Knowledge of West American Plants. I. Katherine Brandegee. (Zoë, ii. 75-83, Pl. xiii).

Varied criticisms upon other authors, and notes on a number of plants. *Boschniakia strobilacea* is figured.

Cypripedium Californicum. J. H. Hooker. (Bot. Mag. t. 7188)

Diseases of the Orange in Florida. L. M. Underwood. (Journ. Mycol. vii. 27-36).

Elodea Canadensis in Russland.—Ein neue Beitrag zur Verbreitung der. F. von Herder. (Bot. Centralb. xlvii. 295).

Note relative to the continual further distribution of this North American species in Russia.

Exostemma Caribæum, R. and S., Probably the "Quina" of the Province of Michoacan, Mexico. (El Estudio, [Mexico.], Tom. iv. No 1).

Ferns of Tamalpais. Mary E. Parsons. (Zoë, ii. 129-131).

Ferns of the Wisconsin Dells. (Am. Gard. xii. 559, 560).

Field Notes on the Plants of Baja California. T. S. Brandegee. (Zoe, ii. 145-152).

Fertilization of Geraniums—The. Alice Eastwood. (Zoë. ii. 112).

A memorandum of facts tending to show cross-fertilization amongst the native *Geraniums* of Colorado.

Flora of Yo Semite—The. Katherine Brandegee. (Zoë. ii. 153-167).

Notes upon specimens collected by members of the California Botanical Club.

Foreigner—A Vigorous. C. M. Weed. (Am. Gard. xii. 620, illustrated).

Under this title is a description and representation of *Lactuca Scariola*, which seems to be causing some apprehension in certain parts of Ohio.

Fossil Remains Considered as Peculiar Kinds of Marine Plants—Remarks on. Leo Lesquereux. (Proc. U. S. Nat. Mus. xiii. 5-12., Pl. i.)

This paper will afford fresh material for discussion by those who are interested in the so-called "problematic organisms."—*Halymenites Herzeri*, *Cylinderites striatus* and *Physophycus bilobatus* are described and figured as new.

Francoa ramosa. (Gard. xl. 241, illustrated).

Golden Rods. H. H. Rusby. (Pharm. Rec. xii. 223, 224).

A popular description of *Solidago* with an incidental plea for it as the national flower.

Hemlock and Parsley. W. W. Bailey. (Am. Nat. xxv. 784-786).

A general discussion of the poisonous properties of *Cicuta* and *Æthusa*, with incidental reference to other Umbelliferæ.

History of Garden Vegetables—The. E. S. Sturdevant. (Am. Nat. xxv. 801-806).

Tomato, (*Lycopersicum sp.*) and Turnips, (*Brassica sp.*) are described.

Ilices—Ueber die Benennung Zweier Nordamerikanischer. Th. Loesener. (Bot. Centr. xlvii. 161-163).

Herr. Loesener discusses the names which should be applied to the Dahoon Holly and the Cassena. He concludes that the Dahoon should be called *Ilex Cassine*, L., and inasmuch as *Cassine Caroliniana*, Lam. (1783) is the earliest name certainly associated with the Cassena this should be known as *Ilex Caroliniana* (Lam.), Loes. He makes no allusion to Prof. Sargent's careful study on this point, the results of which are published in Garden and Forest, ii. 616, and Silva N. A. i. 111, and we presume that he is ignorant of them. Prof. Sargent shows that as Miller published *Ilex Caroliniana* in 1768 for the Dahoon that binomial is not available for the Cassena, which must bear the name *I. vomitoria*, Ait.

Index to North American Mycological Literature. D. G. Fairchild. (Journ. Mycol. vii. 52-63).

Isoetes—Contributions to the Life History of. Douglass H. Campbell. (Annals of Bot. v. 231-256, three plates).

An exhaustive research into the development of *I. echinospora* var. *Braunii.*

Jeffrey's Pine. (Gard. and For. iv. 457, 458, f. 73).

General description of *Pinus Jeffreyi* and its habitats.

List of Mosses Collected by T. S. Brandegee in the Yakima Region of Washington, 1882-3. (Zoë, ii. 106, 108).

A list of thirty-nine species determined by L. M. Underwood and O. F. Cook.

List of Plants Collected by Dr. F. Altimirano in an Expedition to the Vicinity of Patzcuaro, Mexico, in December, 1891. (El Estudio, [Mexico], Tom. iv. Num. 2).

Lobelia laxiflora, H. B. K., var. angustifolia, DC. Dr. Jose. Ramirez. (El Estudio, [Mexico] Tom. iv. Num. 1).

The pharmacognostical characters of the root of this plant are compared with those of *L. fenestralis.* Two handsome full page cuts illustrate the paper.

Lobelia laxiflora, H. B. K., var. angustifolia, DC.—Notes for a study of its physiological and therapeutical action. Dr. Fernando Altamarino, (Loc. cit.).

Mock Oranges—The. (Gard. xl. 288, 289, illustrated).

Philadelphus grandiflorus is figured in the text, and *P. microphyllus* is the subject of a colored plate.

Musci Exotici Novi vel minus cogniti. F. Renauld et J. Cardot. dot. (Bull. Soc. Bot. Belg. xxix. pp. 161-186).

The following American species are described as new:—*Hyophila Martinicæ* from Martinique, *Bartramia radicalis*, var. *plumulosa*, *Philonotis Haitensis*, from Hayti; *Brachymenium Bordazii*, Martinique; *Pilotrichella cuspidans*, Hayti; *Neckera porodictyon*, Hayti, *Porotrichum Bertrandi*, Hayti; *Raphidostegium Barnesi*, Mexico; C. G. Pringle; *Trichosteleum pleuripunctatum*, Martinique.

Musci Novi Guadalupensis, E. Bescherelle. (Rev. Bryol. xviii. 75-77. 1891.)

Five new species in the genera *Splachnobryum*, *Syrrhopodon* and *Distichophyllum* are described.

New or Note-worthy Species, XI. Edward L. Greene. (Pittonia, ii. 216-218.)

Œnothera depressa, *Godetia pulcherrima*, *Madia hispida* and *Pentstemon Sonomensis* are described as new.

New Pine Leaf Rust—A. B. T. Galloway. (Journ. Mycol. vii. 44). *Coleosporium pini* is described as new.

New Species of Fungi from North and South America—Observations on. G. Lagerheim. (Journ. Mycol. vii. 44-52, Pl. X.)

Peronosphora gonolobi, *Doassansia gossypii*, *Uredo gossypii* and *Puccinia heterogenea* are described as new—the latter one figured.

New Species of Uredineæ. J. B. Ellis and S. M. Tracy. (Journ. Mycol. vii. 43).

Puccinia hemizoniæ, *Æcidium oldenlandianum* and *Æ. Malvastri* are described as new.

Northern Plants in Pennsylvania. W. A. Buckhout. (Gard. and For. iv. 447, 448).

Notes on Introduced Plants of Santa Clara. B. F. Leeds. (Zoë, ii. 124-128).

Notes on some Uredinæ of the United States. P. Dietel. (Journ. Mycol. vii. 42, 43).

Notes on the Flora of Canada. J. M. Macoun. (Bot. Gaz. xvi. 285-288).

A list of fifty-one species considered worthy of note, including twenty-two new to Canada.

Notholæna dealbata. (Meehan's Month. i. 49, 50, Pl. iv).

Nova Scotia Fungi. J. Somers. (Proc. and Trans. Nova Scotia Inst. Nat. Sci. vii. 464-466).

Notes on sixteen species.

Peach Blight. E. F. Smith. (Journ. Mycol. vii. 36–38, Pl. v., vi).

Illustrated description of *Monilia fructigena.*

Pinguicula grandiflora. (Gard. xl. fig. 44).

Reciprocal Influence of Stock and Scion. Gustav Eisen. (Zoë, ii. 80-111).

Silva of North America. Vol. II., Cyrillaceæ–Sapindaceæ. Charles Sprague Sargent (4to, pp. 117, Plates *LI-XCVII,* 1891).

The second volume of Professor Sargent's great work, issued during the summer, contains descriptions and illustrations of the following species: *Cyrilla racemiflora; Cliftonia monophylla; Evonymus atropurpureus; Gyminda Grisebachii; Schæfferia frutescens; Reynosia latifolia; Condalia obovata; Rhamnidium ferreum; Rhamnus crocea; R. Caroliniana; R. Purshiana; Ceanothus thyrsiflorus; C. velutinus, var. arboreus; Colubrina reclinata; Æsculus glabra; Æsculus octandra; Æ. Californica; Ungnadia speciosa; Sapindus Saponaria; S. marginatus; Exothea paniculata; Hypelate trifoliata; Acer spicatum; A. Pennsylvanicum; A. macrophyllum; A. circinatum; A. glabrum; A. barbatum; A. saccharinum; A. rubrum* and *A. Negundo.*

Spartina—A Neglected. Geo. Vasey. (Bot. Gaz. xvi. 292).

A note on *Spartina junciformis* and the species with which it has been confused.

Sweet Potato Black Rot. B. D. Halsted and D. G. Fairchild, (Journ. Mycol. vii. 1-11, Pl. i.-iii).

Illustrated description of *Ceratocystis fimbriata.*

Structure and Dimorphism of Hypocrea tuberiformis—On the. Geo. F. Atkinson. (Bot. Gaz. xvi. 282-285, Pl. xxv).

Proceedings of the Club.

The regular meeting was held on Tuesday evening, October 14th, the President in the chair, and twenty-six persons present.

Dr. Rusby, chairman of the Instruction Committee, read an exhaustive report of the season's work. In all, fifty-two students were enrolled, and the work accomplished was most satisfactory.

Many reports were given by the members of their observations during the summer. The supposed biennial blooming of *Habenaria ciliaris* was again discussed, but the question could not be decided from the observations made.

Dr. Morong reported that he and Mr. Rudkin had been investigating the fresh water flowering plants, and that a list of forty-seven species had been noted.

Dr. Rusby exhibited an apple, one side of which showed all the markings of the Tompkins King and the other those of a twenty-ounce apple.

Dr. Britton exhibited from Montana a cactus hitherto unknown to that region, and apparently an undescribed species, probably allied to a prairie species of *Mamillaria.* The spines are slender, flexible and minutely barbed. For the plant, Dr. Britton suggests the name of *Mamillaria Notesleini* in honor of the discoverer.

The second October meeting was held on the 29th, the President in the chair, and thirty-four persons present.

The following were elected active members: Mr. Arthur Rolle, Mr. John F. Barnhart, Mr. B. Frank Hays. Prof. Geo. F. Atkinson, Prof. B. S. Galloway, Mr. Erwin F. Smith and Prof. Chas. Mohr, as corresponding members.

The paper announced for the evening, "Some Botanical Gardens of the Old World," was given by Dr. N. L. Britton.

Mr. Torrey reported Little Falls, N. J., as a near locality for *Camptosorus rhizophyllus.*

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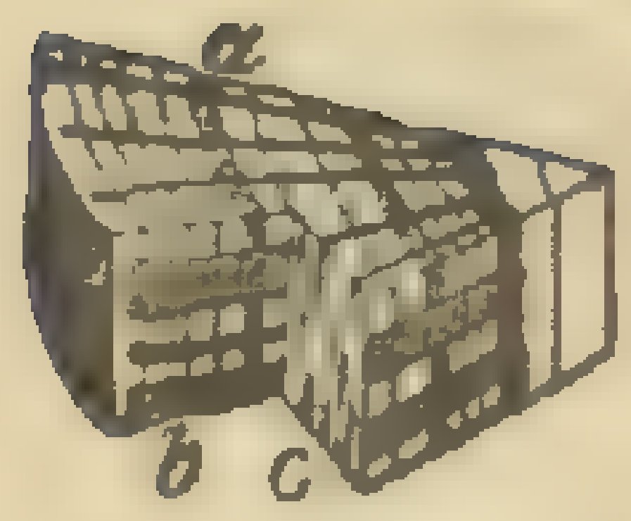

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VOL. XVIII. DECEMBER, 1891. NO. 12.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

A MONTHLY JOURNAL OF BOTANY.

EDITED BY

NATHANIEL LORD BRITTON,

AND OTHER MEMBERS OF THE CLUB.

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BULLETIN
OF THE
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Vol. XVIII.]	New York, December 9, 1891.	[No. 12.

Notes on the North American Species of Eriocauleæ.

By Thomas Morong.

This order is sparsely represented in North America, consisting in fact only of a few outlying members of a tropical family. A single species only is found as far north as Canada, the greater number occurring in the warm sections of the United States. The genus *Lachnocaulon*, however, is endemic in our country, and therefore has a special interest for us. The great bulk of the family is confined to South America, where three-quarters of the three hundred and twenty-five species embraced in it occur. Our own species have been imperfectly investigated and poorly defined, and for this reason the present paper has been prepared in the hope that something may be contributed towards a better understanding of their characters and geographical distribution.

In general aspect these plants may be easily recognized, being very peculiar. The flowers are androgynous or diœcious and contained in more or less hemispherical heads which are enclosed by involucral scales as in the Compositæ. In the place of growth they favor swampy grounds or shallow water, but a few grow in low sandy barrens or fields. In mode of growth they are cæspitose, and new tufts of leaves are added year by year to the stock so that in time quite a little colony is collected about the same caudex, from which scapes, sometimes very numerous, are annually sent up. The scapes are nearly always twisted in the growth, and always marked longitudinally by angles, which are frequently interrupted by intermediate ridges or striæ. As these intermediate ridges are often partial, the number of angles assigned to a scape will vary with the point at which the number is reckoned. This will account for the discrepancy which occurs in the statements of different observers. The large roots are spongy or often conspicuously nodose for their whole length. With three of the genera we have no concern, as two of them, *Philodice* and *Tonina*, both together numbering five species, are restricted to tropical South America, and the other, *Mesanthemum*, numbering three species, is endemic in tropical Africa.

The North American genera may be briefly distinguished as follows:

Segments of the perianth four or six.

Stamens separate. Anthers two-celled. Stamens as many as the perianth segments. 1. *Eriocaulon.*

Stamens one-half as many as the perianth segments. 2. *Dupatya.*

Perianth of three segments. Stamens three, monadelphous below. Anthers one-celled. 3. *Lachnocaulon.*

Eriocaulon is the most extensively diffused genus, being found in tropical and subtropical regions throughout the world. As classified by Körnicke in his monograph the species are divided into fourteen sections. All the species occurring within the borders of the United States, so far as known, are acaulescent or nearly so, the heads single on erect peduncles or scapes, the perianth with one exception four-parted and the stamens four; the Mexican species are the same except in having six-parted flowers and six stamens. The perianth segments, at least the upper ones, are usually spotted with a minute black gland near the centre or the apex. The heads are generally quite villose and grayish in appearance, the parts of the perianth being strongly bearded. The flowers are each subtended by a bract quite similar in markings and general appearance to the perianth segments. Seeds oval, brown when mature and, under the lens, covered with blunt or spiny protuberances.

As the perianth segments are in two series and often separated at a considerable distance, there is much variation in the language applied to them by botanists. Körnicke calls the floral envelopes a double perigonium, the exterior calyculate and interior subcorolline. Kunth speaks of them as a double calyx, while others still regard them as calyx and corolla. The segments of the two series are alternate with each other, sometimes one or both pedicellate or tubular below, sometimes free and separate, often partially or wholly connate.

The floral appendages of these plants constitute a morphological feature of great interest. In *Eriocaulon* the appendage of the staminate flower appears like a style included in and coalescent with the tube of the inner segments, projecting between the bases of the stamens in three small black points which look much like the segmental glands. I do not find this in the pistillate flower. In *Dupatya* and *Lachnocaulon* the appendages are more marked. In the staminate flower they stand up in two or three distinct lobes which are often papillose. In the pistillate flower they are attached to the style in or below the sinuses of the stigmas, apparently enclosing and cohering with the style. Nearly all the botanists who have noticed these appendages regard those of the staminate flowers as rudimentary pistils. Kunth considers them so in both kinds of flowers, but most botanists are content to call those of the fertile flowers merely appendages.

Of the following species seven occur in the United States and five in Mexico, of which two are more particularly described as they approach our boundary near enough to render it probable that sooner or later they will be detected on this side of the border.

1. ERIOCAULON ARTICULATUM (Huds.).

Nasmythia articulata, Huds. Fl. Ang. Ed. 2, i, 415 (1778).
E. pellucidum, Mx. Fl. ii, 166 (1803).
E. septangulare, With. Ar. Br. Pl. ii. 257. (1818); Torr. Bot. N. Y. ii. 335 (1843), and other American authors.

Stem a mere crown. Leaves pellucid, three to eight nerved, fenestrate, acuminate, ½ to 3 inches long, usually equal to the sheaths. Scapes weak, commonly twisted, about seven-angled, smooth, mostly from 4 to 8 inches in height, but sometimes scarcely one inch, and when submersed often elongating till they are from 4 to 10 feet long, usually solitary but occasionally clustered. Involucral scales smooth or the innermost bearded at the apex, oblong, obtuse, entire, scarious, of a livid or fuscous tint, usually shorter than the flowers. Heads androgynous, the marginal flowers usually staminate. Bracts cuneate or obovate, abruptly pointed, fuscous above and white bearded, receptacle smooth, flowers about 1¼ lines high, the outer sterile perianth tubular below and its lobes at some distance from the inner, all bearded at the apex. The gland is borne sometimes on the bract and both pairs of segments, and sometimes only on the upper pair. One of the upper pair is generally larger than the other. Fertile flowers scarcely more than half the size of the sterile, the pairs of perianth segments without a tube, and much nearer together than the sterile, all densely bearded.

Still, shallow water, ponds and streams, Newfoundland to Ontario, New England and Minnesota, south to Florida and Texas. Occurs in Great Britain. July to October.

2. ERIOCAULON COMPRESSUM, Lam.

E. compressum, Lam. Encyc. iii. 276 (1789); Körnicke, Linnæa, xxvii. 592 (1854).

E. gnaphalodes, Mx. Fl. ii. 165 (1803), and American authors generally.

Leaves coarsely or finely six to twenty fenestrate-nerved, usually shorter than the sheaths, tapering to a long, sharp point, rigid, or when submerged thin and pellucid, scapes 6 to 35 inches high, smooth, more or less compressed when dry, ten to twelve angled. Involucral scales rounded, obtuse, scarious, shining, smooth, imbricated in three or four rows, heads frequently dioecious, 3 to 6 lines in diameter. Receptacle smooth. Flowers 1½ to 2 lines high. In other respects like the preceding species.

In anthesis the styles and stigmas are much exserted, standing above the heads like projecting threads. The sheaths are obliquely fissured, obtuse at the point, veined like the leaves.

In still, shallow water, ponds and streams, New Jersey to Texas. Cuba. May to October.

3. ERIOCAULON DECANGULARE, L.

E. decangulare, L. Sp. Pl. 87 (1753).

Caudex short and thick, from one to two inches long. Leaves finely many-nerved, or often apparently nerveless, ensiform, tapering to a blunt point, usually much longer than the sheaths, 6 to 20 inches long and 2 to 8 lines broad. Scapes stout, rigid, smooth, ten to fourteen-angled, 1 to 3 feet high. Heads 4 to 8 lines in diameter. Involucral scales ovate, often eroded, dentate at the apex and hairy below. Receptacle hairy, the hairs under the microscope many-celled, appearing acute at the apex or very rarely club-shaped. Flowers about 2 lines high, densely woolly at the base, the bract larger than the flowers acute, white-bearded. Perianth segments spatulate, white-bearded.

Swamps, New Jersey and Pennsylvania to Florida and Texas. Cuba. June to October.

4. ERIOCAULON RAVENELII, Chapm.

E. Ravenelii, Chapm. Fl. 503 (1860).

Very smooth throughout. Leaves linear, very acute, flat, thick or thin and pellucid, finely five to ten-nerved, somewhat longer than the sheaths. Scapes slender, 4 to 5 inches high, clustered, five to six-sulcate. Sheaths obliquely fissured, acute, nerved like the leaves. Heads 1 to 2 lines in diameter. Involucral scales scarious, light straw-colored, oblong, very obtuse. Bracts a little narrower than the scales, often obtusely pointed and denticulate, fuliginous. Flowers scarcely more than ½ line high, fuscous, smooth. Segments of the outer fertile perianth separate, very slender, mucronately pointed; of the inner somewhat broader, minutely toothed. Ovary sessile; style parted into two stigmas. Chapman states that the style is occasionally simple and the seeds minutely pubescent. The specimens which I have examined failed to show either.

Wet grounds, S. C.

5. ERIOCAULON TEXENSE, Körn.

E. Texense, Körn. Linnæa, xxvii. 595 (1854).

Scapes smooth, 8 to 10 inches high, six to seven-sulcate, slender, in the specimens examined solitary. Leaves acuminate, many-nerved, fenestrate, flat, smooth, 1 to 2 inches long, a little shorter than the sheaths. Roots fibrous, the larger ones nodose. Heads hemispherical, 1 to 2 lines in diameter. Involucral scales obovate or nearly orbicular, smooth, entire, straw-colored. Receptacle pilose with silky hairs. Bracts as long as the flowers, cuneate or obovate, the upper part livid, the lower whitish, rounded or more commonly pointed at the apex, hairy on the back and fimbriate at the apex with a coarse white beard. Flowers about 1 line long. Outer perianth segments in the staminate flower free, abruptly acute, slightly longer and larger than the inner, spatulate, fuscous above and bearded. Pistillate flowers bearded similarly to the staminate, the lobes occasionally three; ovary shortly stipitate, dicoccous; stigmas two. The heads appear densely villous. This species is easily distinguished from *E. articulatum* and *E. compressum* by its villose receptacle, and from *E. decangulare* by its smaller stature, its more slender scape, shorter and acute bracts, smaller heads and flowers.

Texas, Drummond, 2nd coll., n. 409.

6. ERIOCAULON KÖRNICKIANUM, Van Heurck & Müll. Arg.

E. Körnickianum, Van Heurck et Müll. Arg. Obs. Pl. Nov. Herb. Van Heurck, 101 (1870).

I have not seen a specimen of this Texan plant, but the authors of the species describe it as having pellucid leaves which are five to seven-nerved, plane, smooth, 8 to 11 lines long and a little over 1 line wide at the base. Scapes numerous, 4 to 5 inches high, setaceous, smooth, compressed, two to three-angled, with lax sheaths which are as long as the leaves. Heads ovoid-globose, about 1½ inch long, a little longer than broad. Involucral scales fuliginous, broadly obovate, irregularly denticulate and white-woolly above, at length slightly recurved. Receptacle smooth. Bracts not quite 1 line high, surpassing the flowers. Sterile flowers about ½ line high; outer perianth segments smooth and black-glandular at the apex; inner obovate and pilose at the apex. Stamens four. Inner perianth segments of the fertile flower white-woolly on the margins. Style two-parted, plainly destitute of appendages. Seeds ellipsoidal, rough papillose.

East Texas. Coll. Charles Wright, in Herb. DC. et Van Heurck.

7. ERIOCAULON MICROCEPHALUM, H. B. K.

E. microcephalum, H. B. K. Nov. Gen. i. 253 (1815); Kunth Enum. 3. 548 (1841).

Small cæspitose plants. Leaves 4 to 8 lines long, acute, five to eight fenestrate-nerved, smooth above, often woolly at the base. Scapes clustered, numerous, 4 to 6 lines high, smooth, four-angled, the angles often separated by finer intermediate striæ. Sheaths shorter than the leaves, rather obtuse at the point. Heads globular, about 1 line in diameter. Involucral scales broadly obovate, entire or denticulate, very light straw-colored, smooth or sometimes scantily fimbriate at the apex. Receptacle smooth. Bracts obovate, acute or obtuse, longer than the flowers, bearded at the apex. Flowers trimerous, a little more than 1 line high. Staminate flowers pedicellate; exterior perianth segments sometimes two only, obtuse, the posterior ones connate in a keeled hood and white pilose at the top; interior segments white, tubular below, three-lobed above, the lobes fimbriate, rounded, denticulate or entire at the apex. Stamens six. Fertile flowers sessile, exterior perianth segments often two only; fuscous above and pilose, the interior more delicate and longer, white, spatulate, obtuse, pilose internally and on the margin. Ovary sessile, three-celled. Style three-parted; stigmas three.

This species has found its way from Jalisco, Mexico, where it is common, to Fort Tejon, California, at which place it was collected by Xantus in the expedition of 1857–8, although it is not enumerated in Dr. Gray's list of Xantus' plants. I find specimens of it without a name in the Torrey Herbarium.

8. ERIOCAULON BENTHAMI, Kunth.

E. Benthami, Kunth. Enum. 3, 545 (1841), originally published by Bentham in his Pl. Hart., p. 28, as "*Eriocauli*, sp. nov?"

Leaves 1 to 3 inches long, smooth, about the same length as the sheaths or longer; eight to twelve-nerved, obtuse and callous at the apex. Scapes 4 to 15 inches high, smooth, six or seven-sulcate. Roots thick, nodose. Heads very white-woolly, globose, 2 to 3 lines in diameter. Involucral scales smooth, obtuse, somewhat longer than the bracts, straw-colored. Receptacle pilose. Bracts spatulate, fuscous, abruptly acute, woolly on the back and coarsely white-bearded on the apical margins. Flowers 1½ line high; perianth six-parted, the three exterior segments free, white below, fuscous above and bearded at the apex. In the staminate flower the interior perianth is stipitate and the two anterior segments are connected with the posterior one; in the pistillate flower they are free. All the segments are bearded at the apex. Stamens six. Ovary stipitate, three-celled; style three-parted. The species is well distinguished from *E. decangulare*, to which it is similar in habit, by its six-parted flowers. Hartweg collected this plant at Lagos, Mexico.

Wet grounds, Province of Jalisco, Mexico, Palmer, 1886, No. 44, and Pringle, 1888, No. 1,734. June–November.

9. ERIOCAULON PRINGLEI, S. Wats.

E. Pringlei, S. Watson, Proc. Am. Ac. xxiii. 283 (1888).

A delicate plant with slender five to six-sulcate scapes ½ to 5 inches high, all the parts very smooth. Leaves acuminate, flat, about three-nerved, as long as or a little longer than the sheaths. Roots finely fibrous, spongy. Heads 1 to 1½ lines in diameter, fuscous. Involucral scales obovate, scarious, very dark, eroded at the apex. Receptacle smooth. Bracts pointed. Flowers scarcely ½ line high. Exterior perianth segments in both kinds of flowers two; the interior three. Sterile flower—outer segments free, pointed, entire; inner with a short tube or stipitate, eroded or denticulate at the apex. Stamens six. Fertile flower—outer segments the same; inner very narrow, shortly tubular at base. Ovary three or sometimes two-celled. Style three or sometimes two-parted.

Wet places at the base of Sierra Madre, Chihuahua, Mexico. Pringle, No. 2,018. October.

2. DUPATYA, Vell. Fl. Flum. 35, No. 42 (1825).

Pæpalanthus, Mart. Nov. Act. Nat. Cur. xvii. 1, 13 (1833-5).

This genus closely resembles *Eriocaulon* in general appearance and habit, but is distinguished by having the interior segments of the sterile flower campanulate-tubular, and the stamens of the same number as the lobes. The flowers are with rare exceptions three-parted throughout, the three stigmas often bifid. Seeds oval, more or less costate.

The genus is very extensively represented in South America, being concentrated in Brazil. Körnicke in his monograph enumerates 215 species. Only one is found in North America.

1. DUPATYA FLAVIDULA (Mx.).

Eriocaulon flavidulum, Mx. Fl. ii. 166 (1803).

Pæpalanthus flavidulus, Kunth, Enum. iii. 532 (1841).

Dupatya flavidula, Kuntze, Rev. Gen. Pl. 745 (1891).

Leaves 1 to 2 inches long, three to five-nerved, linear-subulate, floccose at base and smooth or sparingly pubescent above. Scapes numerous, five-sulcate, pubescent, 4 to 12 inches high. Sheaths longer than the leaves, obliquely fissured, slightly inflated at the summit, pubescent like the scape. Heads 2 to 3 lines in diameter. Involucral scales straw colored, scarious, smooth, shining, oval or ovate, obtuse, somewhat hairy at base. Receptacle pilose. Bracts very thin, white, linear, rounded or pointed at the apex, about as long as the flowers, slightly hairy, often obsolete. Flowers about 1¼ line high, trimerous, long pedicellate. Sterile flowers—outer perianth segments woolly at base, obovate or truncate and pilose at the apex. This encloses the inner part of the perianth consisting of a smooth, delicate, white; campanulate, somewhat three-toothed tube; stamens three, slightly exserted. Fertile flowers—outer perianth segments distinct, hairy at base, linear, acute, smooth, white, upper similar but much narrower, enclosing the ovary and connate over it nearly to the top. Style three-parted, forming three stigmas. Seeds sparingly and obscurely costate when mature. Roots spongy, scarcely nodose.

Körnicke (Linnæa, 27, 590) under the name *Eriocaulon flavidulum*, Mx., following Pursh (Fl. 1, 92) and Elliott (Bot. ii 566) states that two plants have been sent from North America under this name and that he regards Kunth's *P. flavidulus* as something distinct from the plant of Michaux. That which he describes is undoubtedly something distinct and is clearly an *Eriocaulon*, but, so far as I can judge, it corresponds very nearly, if not quite, to *E. articulatum.* The plant of Elliott is also, I think, that species. Michaux distinctly calls his species *puberulent* and the scapes *aggregated* and five-striate, while his other characters correspond very well with our plant. There is not, so far as ascertained, any other in the habitat given by him, "Carolina" that bears such characters.

Low sandy pine barrens, So. Va. to Florida. March–July.

3. LACHNOCAULON, Kunth, Enum. iii. 497 (1841).

Very similar to *Eriocaulon* in general appearance and habit, but distinguished by having the outer perianth only, the flowers always three-parted, three stamens which coalesce in a tube beneath, and one-celled anthers. The staminal tube appears to take the place of the sterile outer perianth segments of *Eriocaulon* and *Pæpalanthus*, and the place of the inner segment of the fertile flower is occupied in this genus by a loose mass of hairs, or sometimes by three rows of hairs. Style club-shaped, dividing into three bifid stigmas which alternate with three appendices.

The genus is confined to the Southern United States, in which four species occur.

1. LACHNOCAULON ANCEPS (Walt).

Eriocaulon anceps, Walt. Fl. Car. 83 (1788).

E. villosum, Mx. Fl. ii. 166, (1803) Pursh, Fl. i. 92, (1814).

L. Michauxii, Kunth, Enum. iii. 497, (1841) Chap. Fl. 504, (1860).

Leaves 1 to 3 inches long, tapering to an obtuse callous point, smooth or sparingly hairy, seven to twelve-nerved or often apparently nerveless. Scapes slender, 2 to 20 inches high, two to four-ribbed, the ribs themselves often with intermediate striæ, clothed with long, soft, appessed, upwardly-pointed hairs. Sheaths as long as or shorter than the leaves, hairy like the scape, and pointed like the leaves. Heads globose, 1 to 3 inches in diameter. Involucral scales ovate or oblong, obtuse or pointed, smooth or hairy, shorter than the flowers, usually fuliginous. Flowers about 1 line high, bracts fuliginous, spatulate, often keeled, surrounded at base by the yellowish, silky hairs of the villose receptacle and white bearded at the apex. Perianth segments in the sterile flower on a short stipe which is hairy at the base, spatulate, fuliginous and fimbriate at the apex. Those of the fertile flower white, smooth, oblong, obtuse; ovary sessile, densely villous around the base; style three-divided; stigmas bifid, seeds strongly costate. Roots finely fibrous. The white segments of the fertile perianth mingled with the fuliginous woolly segments of the sterile flowers impart a mixed gray and dark appearance to the heads.

Low pine barrens, So. Va. to Florida. March–June.

2. LACHNOCAULON GLABRUM, Körn.

L. glabrum, Körn. Linnæa, xxvii. 568, (1854), Chap. Fl. 504, (1860).

Leaves ½ to ¾ inch long, flat, acuminate, blunt and callous at the tips, about as long as the sheaths, smooth or with a few scattered hairs at the margins. Scapes numerous, smooth, 3 to 4 inches high, and three to five-angled. Heads very dark and nearly smooth externally, at first globose, becoming cylindrical or slightly conical and 3 lines long, looking, as Chapman observes, not unlike those of *Eleocharis ovata.* Involucral scales fuscous, lighter in color than the bracts and flowers, ovate, acute, smooth or pubescent. Receptacle villous with clavate hairs. Bracts very dark, pubescent, carinate on the back and cucullate at the apex, enclosing the flowers. Flowers scarcely ½ inch high, much smaller than those of No. 1. Segments woolly at base, the anterior much like the bract and partially enclosing the others. The peculiar dark, matted, and smoothish appearance of the heads in this species is owing to the cucullate bracts and flowers which are closely packed together.

Roots finely fibrous, not nodose. Ovary three-celled, styles divided into three stigmas. Körnicke makes the stigmas bifid, but in all the specimens that I have examined they are entire. Seeds strongly costate.

Sandy shores of the Gulf of Mexico, Florida. (Chapman). Oct.

3. LACHNOCAULON BEYRICHIANUM, Sperdeler.

L. Beyrichianum, Sperdeler in Körn. Linnæa, xxvii. 567, (1854).

Leaves bright green, 1 to 1½ inch long, tapering to a sharp point, obscurely nerved, often woolly at base, scantily hairy above, somewhat longer than the sheaths. Scapes numerous, 1 to 3 inches high, three to five-striate, sparsely hairy, the hairs like those of No. 1. Heads globose or cylindrical and slightly longer than broad, 1 to 1½ lines long, grayish-villose, the hairs very apparent. Involucral scales oblong, obtuse, hairy or becoming glabrate, fuscous. Bracts spatulate, somewhat larger than the flowers, smooth or grayish pubescent above. Segments of perianth much the same. Flowers scarcely half a line high. Receptacle hairy as in No. 2. Styles divided into three simple stigmas.

Körnicke attributes this species to Ebenezer, a place in middle Georgia, collected there in July by Beyrich. It was distributed as *L. glabrum* by Curtiss, No. 3,022, collected by him on "Sandy shores, Walton County, N. W. Florida." September.

Bentham and Hooker (Gen. Pl. iii. part 2, p. 1,024) regard Körnicke's plants as well developed specimens of *L. anceps*, but the species is quite distinct both from *L. anceps* and *L. glabrum*. From the former it is distinguished by its much smaller size, numerous scapes, smaller and more elongated heads, obtuse involucral scales, far smaller flowers and simple stigmas; from the latter by its hairy scapes, grayish-villose, nearly globose and far smaller heads.

4. LACHNOCAULON DIGYNUM, Körn.

L. digynum, Körn. Linnæa, xxvii. 570, (1854).

I have not seen specimens of this. Körnicke attributes it to Alabama, from whence it was sent by Bentham, and describes it as having a leafy epigean stem ½ to 1½ inch in length. Leaves smooth, nervose-striate, flat, bright green, 4 to 7 lines long. Scapes smooth, 3 to 5 inches high. Sheaths obliquely fissured, sparsely pilose, a little longer than the leaves. Heads semi-globose, 1 line in diameter, grayish-villose. Involucral scales oblong, acute, ciliate at the apex and villous on the back, at length glabrescent, fuscous. Bracts spatulate, carinate. Receptacle pilose. Flowers pedicellate; segments of the perianth connate toward the base, spatulate, rounded and hairy at the apex. Stamens three, anthers oblong, white; the triple segments of the rudimentary pistil in the sterile flower papillose. Fertile flowers sessile, segments of the perianth free, obovate, narrowed at the base, pilose at the top of the back. It differs, according to Körnicke, from all the preceding species in having a two-celled ovary, two appendices, a two-parted style and bifid stigmas.

It is regarded by Benth. and Hook. l. c. as probably a depauperate form of *L. anceps*, with heads not yet well developed, but it appears to me to come much nearer to *L. Beyrichianum*. Fresh specimens are very desirable.

New or Noteworthy North American Phanerograms.—V.

By N. L. Britton.

Thalictrum dioicum, L. var. CORIACEUM n. var. Segments of the decompound leaves firm, pale beneath, rather dark green above, reniform-orbicular and broader than long, or obovate, deeply and sharply incised, the lobes rounded. "Plant always diœcious, staminate flowers white, pistillate purple."

At elevations above 3,000 feet, on Blowing Rock, Table Rock and Stone Mountain, North Carolina. Collected by J. K. Small and A. A. Heller, 1891, and by Professor Porter in the same region many years before.

Ranunculus delphinifolius, Torr. in Eaton, Man. Ed. 2, 395 (1818) and subsequent editions; not H.B.K. Nov. Gen. v. 48 (1821).

R. multifidus, Pursh, Fl. Am. Sept. 736 (1814) not Forskall (1775).

R. fluviatilis, Bigel. Fl. Bost. 139 (1814) not of Willd.

R. Purshii, Hook. Fl. Bor. Am. i. 15 (1830) in part.

R. lacustris, Beck & Tracy, in Eaton, Man. Ed. 3, 395 (1822).

The name of this plant has had a very curious history, which I am now prepared to trace, having seen authentic specimens of all the above-cited descriptions. First characterized by Pursh, who gave it a name already belonging to an Egyptian or Arabian plant, it was next alluded to by Dr. Torrey, under the name *R. delphinifolius*. Pursh's type was collected by Bradbury in "Upper Louisiana," and is preserved in the Herbarium of the Academy of Natural Sciences of Philadelphia. Torrey's plant was from New York, and a specimen bearing the label in his own handwriting is contained in the Kew Herbarium, "*R. delphinifolius*, Torr. in Eat. Man. Ed. 2." In his catalogue of plants within thirty miles of New York (1819), Torrey adopted Bigelow's name *R. fluviatilis* for the species; in his Compendium he took *R. multifidus*, and in the Flora of North America and Flora of New York he called it *R. Purshii*, never returning to his original name for it. I have been unable to ascertain his reason for this course. Perhaps, he thought this was preoccupied by the homonym of Humboldt, Bonpland and Kunth, which was published, however, three years later.

In his discussion of this plant in Pittonia, ii. 62, Professor Greene adopts the name of Beck and Tracy and I have followed him in alluding to it, but the Kew specimen from Dr. Torrey and a glance at the second edition of Eaton's Manual are conclusive proof that we have been wrong.

The arctic and Rocky Mountain plant, *R. Purshii*, Richards, Frank. Journ, 741 (1823); *R limosus*, Nutt., *R. multifidus*, var. *repens*, S. Wats., appears to me to be specifically distinct. It is a creeping, pubescent, uliginous species with smaller flowers and smaller achenes which have an acutish back, and the style is slender; *R. delphinifolius* is normally strictly aquatic, glabrous, its achenes have a thickened, almost winged margin, and the style is flat and broadened at the base. It develops broader leaf-segments when the water in which it habitually grows becomes low and the plants thus become emersed.

It should be added that a specimen from Dr. Torrey, labelled *R. lacustris*, Beck and Tracy, is preserved in the Philadelphia Herbarium, and is the same species as *R. multifidus*, Pursh, which may be further proven by the figure of *R. lacustris* published by Beck and Tracy in Trans. Albany Inst. i. plate V. I have not access to a copy of the first edition of Eaton's Manual.

Ranunculus trichophyllus, Chaix, in Vill. Hist. Pl. Dauph. i. 335 (1786).

R. aquatilis, var. *trichophyllus*, A. Gray, Man. Ed. 5, 40 (1867).

I think this should rank as a species rather than a variety of *R. aquatilis*, L., which only exists in America, as far as known, in the far northwest, where it is represented by the var. *heterophyllus*, as pointed out by Dr. Gray.

Hypericum mutilum, L. Sp. Pl. 787 (1753).

Ascyrum Crux-Andreæ, L. loc. cit.

While it may, perhaps, be ascribed to a blunder in the make-up of the first edition of the "Species Plantarum," there is no doubt whatever that Linnæus described the same plant as two species in different genera on the same page. This has been indicated by Torrey and Gray, (Fl. N. A. i. 672). The specimen described by Plukenet (Mant. 104), as "Hypericoides ex terra Mariana floribus exiguis luteus" on which Linnæus based his *A. Crux-Andreæ*, is preserved in the Sloane Herbarium, (vol. 92, p. 85), at the British Museum of Natural History, and is *Hypericum mutilum*, while the specimens of Gronovius, on which he based *H. mutilum*, are in the general herbarium of the same institution. The plant taken up by Torrey and Gray for *A. Crux-Andreæ* is *A. hypericoides*, L. Sp. Pl. 788, as evidenced by the Gronovian specimen on which it is based, fortunately also preserved.

President Coulter, in his paper on the North American Hypericaceæ (Bot. Gaz., 1886, 80), has maintained that we have two closely related species of *Ascyrum*, associating specimens from the southern states with the tropical American plant which Linnæus took up for his *A. hypericoides* in the second edition of his Species Plantarum (p. 1108), basing it on specimens sent him by P. Browne from Jamaica, one of which is preserved in his herbarium. However, whether we have one species or two, the northern plant is the original *A. hypericoides*, and should bear that name. All the specimens in the Columbia College Herbarium, including many from Florida, are readily referable to it, and different from the West Indian and Central American species.

Hypericum Canadense, L., var. *minimum*, Choisy in DC. Prodr. i. 550.

The type of this is preserved in the "Prodromus Herbarium" at Geneva. It is a fragment of a three-styled species with narrow leaves, not satisfactorily referable to *H. Canadense*, though it may as well be that as anything else, and its origin is unknown. From Choisy's remarks at the place of publication, he apparently thought it was Mexican. In any event it is not at all the Northern plant with oval or orbicular lower leaves which has been refered to it, and which may be called *H. Canadense*, var. BOREALE.

Potentilla Canadensis, L. Sp. Pl. 498 (1753).

Potentilla simplex, Michx. Fl. Bor. Am. i. 303 (1803).

P. Canadense, var. *simplex*, T. and G. Fl. N. A. i. 443 (1840).

From the very great difference in appearance of the extreme forms of this plant, I had about come to the conclusion that *P. simplex*, the large, ascending or erect condition, was actually specifically distinct from the smaller one with prostrate branches. But a study of the plant during the past spring in the vicinity of New York has convinced me that *simplex* cannot be separated even as a variety, for I found them growing from the same clump. In shaded woodlands the *simplex* condition prevails, while the other prefers open places, and reaches its extreme degree of depression (var. *pumilio*, T. and G.) in very dry, sterile soil. There is, therefore, no more reason for maintaining varieties in it than in the case of *Erigeron Canadense*, which varies from an inch in height to ten feet or more. The type of *P. Canadense*, L is preserved in the Linnæan Herbarium, and that of *P. simplex*, Michx. in the herbarium of Michaux at Paris, and so far as they go, are correctly understood.

RUBUS MILLSPAUGHI, n. sp.

Ascending, wand-like, entirely unarmed or with a very few, weak prickles above, glabrous throughout or the younger shoots scurfy-pubescent. Stems 1½-4 meters long; leaves long-petioled, pedately five-foliolate or some of those on the twigs three-foliolate; leaflets thin, oval, glabrous on both sides, long-acuminate at the apex, mostly rounded at the base, 12-15 cm. long, about 5 cm. wide, sharply but not deeply serrate; stalk of the terminal leaflet 7-10 cm. long; inflorescence loosely racemose; bracts linear-lanceolate; pedicels slender, ascending; sepals lanceolate, acuminate; fruit black, about 10 mm. long.

In rich woods, Point Mt., West Virginia, at 3,500 ft. altitude (C. F. Millspaugh). Nearest to *R. villosus*, but evidently a distinct species. Curiously enough there is a leaf of this plant glued down on the sheet of *R. Canadensis*, L. in Herb. Linn., and it appears to have been included in his description of that species—the specimens furnished by Kalm.

Agrimonia striata, Michx. Fl. Bor. Am. i. 287 (1803).

A. Eupatoria of most American authors, not of L.

A. Eupatoria, var. *parviflora*, Hook. i. 196 (1832).

The American plant has certainly been erroneously referred to the European *A. Eupatoria*, which is very distinct from it, by its larger flowers and fruit, denser inflorescence, much greater amount of pubescence and different foliage. The genus *Agrimonia* was monographed by Wallroth in his "Beiträge zur Botanik," i. 1-61 (1842), and a much larger number of species recognized than have since been admitted. There is at least one of his North American species there first described, which seems to me perfectly good; this is:

Agrimonia microcarpa, Wallr. Beitr. i. 33, 39, t. 1. f. 3. (1842).

Smaller and more slender than *A. striata*, villous-pubescent at least below. Larger leaflets 3-5, obovate, obtuse or sometimes acutish at the apex, narrowed or cuneate at the base, dentate, 1½-5 cm. long, glabrous or nearly so above, generally pubescent along the veins beneath; raceme very slender, the flowers short-pedicelled, less than two lines broad; petals slightly exceeding the calyx-lobes; fruit smaller, about 3 mm. long.

In dry soil, Pennsylvania (according to Wallroth), Maryland (Rusby), to Florida (Chapman), west to Kentucky (Short) and Louisiana (Carpenter).

MAMILLARIA NOTESTEINII, n. sp.

Stems oval, simple or cæspitose, about 3 cm. in diameter. Tubercles nearly terete and about 6 mm. high; spines 12-18, white, becoming gray with age, weak and slender, 8-12 mm. long, spreading, pubescent throughout. Usually each tubercle bears a central spine which is longer and stouter than the others, and is frequently tipped with pink; flowers 15-25 mm. in diameter, ash-gray, tinged and penciled with a delicate pink. Petals broadly linear-oblong, mucronate tipped; fruit obovoid; seeds black, globose, pitted.

Found in gravelly soil, near a small creek, in the vicinity of Deer Lodge, Montana, by Prof. F. N. Notestein, June 4th, 1891.

OXYPOLIS, Raf. Neogen. 2 (1825).

Tiedemannia, DC. Mem. Omb. 51, t. 12 (1829).

Archemora, DC. loc. cit. 52 (1829).

Rafinesque characterizes the genus and cites *Sium rigidius*, L. as the type, so there can be no question about what he had in mind. This plant is well known to be *Archemora rigida*, DC., and *Tiedemannia rigida*, Coult. and Rose.

PTILIMINUM, Raf. Neogen. 2 (1825).

Discopleura, DC., Mem. Omb. 38 (1829).

Rafinesque also characterizes this genus and gives *Ammi capillaceum*, Michx., as the type. This is *Discopleura capillacea*, DC.

SPERMOLEPIS, Raf. Neogen. 2 (1825), not Brong. & Gris.
Leptocaulis, DC. Mem. Omb. (1829).

This genus is based on *Daucus divaricatus*, Walt., which is *Sison pusillum*, Michx., *Leptocaulis divaricatus*, DC., and *Apium divaricatum*, Wood. If this species and its allies are to be kept distinct from *Apium*, L. as has been done by Coulter and Rose, it should be under Rafinesque's generic name.

ADORIUM, Raf. Neogen. 3 (1825).
Marathrum, Raf. Journ. Phys. lxxxix. 101 (1819), not Humb. and Bonpl.
Musenium, Nutt. in T. and G. Fl. N. A., i. 642 (1840).

Perceiving that the generic name *Marathrum* was already used, Rafinesque substituted for it *Adorium*, eleven years before Nuttall named *Musenium*. The names of Rafinesque and Nuttall are both based on *Seseli divaricatum*, Pursh.

Solidago juncea, Ait. var. RAMOSA, Porter and Britton, n. var.

Differs from the typical plant in the numerous, strict, erect branches, the racemes numerous, slender, erect or slightly recurved at the ends.

In fields, western New Jersey and eastern Pennsylvania (Porter), Ohio (Sullivant), and West Virginia (Millspaugh). Strikingly different in appearance from *S. juncea*. Professor Porter informs me that he sent specimens of the plant to Dr. Gray, after the volume of the Synoptical Flora containing the Compositæ was issued, and was told that he had not seen it before.

Cyperus Houghtoni, Torr. Ann. Lyc. N. Y. iii. 277 (1836).

This species was described by Dr. Torrey from a specimen collected by Dr. D. Houghton at the Lake of the Isles, Northwest Territory, in August, 1831, (No. 73), and the type of it is preserved in the Columbia College Herbarium. He subsequently concluded that it was not distinct from his *C. Schweinitzii*, as is indicated in pencil in his copy of the Monograph of North American Cyperaceæ, and in his copy of Steudel's Cyperaceæ. In his herbarium the types of both species are mounted on the same sheet. I passed the plant over in my Preliminary List of North American Species of Cyperus, (BULLETIN, xiii. 205-216), having only the original specimen to go by, and accepting Dr. Torrey's later view. But recently I have had numerous specimens from the Northwest and other regions, which maintain the characters of the original, and satisfactorily establish the species as a good one.

My attention has been especially called to it by Mr. John M. Holzinger, Assistant Botanist to the U. S. Department of Agriculture, who last year sent me abundant specimens collected by Dr. E. A. Mearns, U. S. A., at Camp Douglas, Wisconsin. I did not then recognize in these Torrey's species, and was disposed to regard the plant as undescribed. Mr. Holzinger has again sent me more and very fine specimens of Dr. Mearns' collection of 1891, and thus by impressing on me the characters of the plant, caused me to make a careful examination of the group to which it belongs.

The species is nearest *C. Schweinitzii*, but readily distinguishable from that plant by its globose, dense heads, smooth culms, shorter and broader truncate or apiculate scales, and shorter nut. I have it now from the following localities: Lake of the Isles, N. W. Terr., (Houghton No. 73); Camp Douglass, Wisc., (Mearns No. 28); St. Croix River, Minn., (Holzinger); Cheboygan Co., Mich., (C. F. Wheeler); Wichita, Kans., (Carleton); Columbia River, Sand Island, Oregon, (Thos. Howell); Kuskuski River, (Wilkes Exp.); Wareham, Mass., (Ex. Herb. L. H. Bailey); Lake George, N. Y., (Wm. H. Leggett). It thus ranges all across the continent. I referred the Oregon specimens collected by Geyer, which I saw in Herb. Gray to this species in my Preliminary List, but was uncertain about them. They probably belong here.

The plant which I described in my Preliminary List (p. 208) as *C. Schweinitzii*, var. *debilis*, which extends from Colorado (Redfield) to Chihuahua, is most likely another distinct species.

Rynchospora scutellata, Griesb. Cat. Pl. Cub. 246 (1866).

This species, founded on Charles Wright's No. 3406 from Western Cuba, was collected by the late Mr. H. W. Ravenel on damp prairies near Indianola, Texas, May 3d, 1869, (No. 160), and distributed under the manuscript name *Ceratoschœnus brevirostris*, n. sp. I am indebted to Mr. C. B. Clarke for the determination. The following description may serve for its identification: Stem erect, rather stout, 3-9 dm. high, glabrous. Leaves linear, flat, the lower 3-4 dm. long, 6-8 mm. wide, slightly roughened on the margins, those of the stem distant, shorter; spikelets lanceolate 6-10 mm. long, three to five-flowered in corymbose clusters, the rays slender, unequal, 2½-5 cm. long; clusters composed of three to five spikelets; glumes brown, ovate, acute, mucronate, the fertile ones larger than the sterile; nut brown, ovate or obovate, compressed, slightly concave on each face, 3-4 mm. long, finely puncticulate, with a rather prominent keel on both edges; beak black, compressed, conic, about as long as the nut, slightly papillose, bristles slender, unequal, the larger equaling or slightly exceeding the nut, finely barbed upwardly.

The Texan specimen differs from the Cuban only in its larger and denser clusters and somewhat narrower nut. The species comes next to *R. corniculata*, (Lam.)

STENOPHYLLUS, Raf. Neogen. 4 (1825).

This proposed genus of Rafinesque is briefly characterized by him and *Scirpus stenophyllus*, Ell. named as the type. This plant is the same as *Dichroma cæspitosa*, Muhl., and was transferred to *Isolepis* by Dr. Torrey in his monograph of the North American Cyperaceæ (Ann. Lyc. N. Y. iii. 353, 1836). In 1837 Kunth (Enum. ii. 209) independently referred it to *Isolepis*, but under a section which he proposed should form a genus under the name *Bulbostylis*, although he did not name the species under that genus. I allude to Rafinesque's genus here because Mr. C. B. Clarke has sent me specimens of the Indian *Isolepis barbata*, a very closely allied species under the name *Bulbostylis barbata*, and informe me that he has adopted Kunth's genus as distinct from *Fimbristylis* and *Scirpus* in his forthcoming monograph of the Cyperaceæ. Rafinesque's generic name has twelve years priority over Kunth's. Our *Fimbristylis capillaris* (L.) and a number of tropical American species are congeners. The genus is especially distinguished by the thickened, persistent base of the style, and most of its species have ciliate leaves.

Notes on Three New or Noteworthy Diseases of Plants.

BY F. D. CHESTER.

During the work of the past summer my attention has been called to three diseases of cultivated plants, caused by fungi, which are apparently new.

A brief description of them will be given here, while a fuller account, with figures, will be reserved for one of the regular publications of the Experiment Station.

ANTHRACNOSE OF THE TOMATO.

This disease appeared during the past summer upon the grounds of the Experiment Station, where it has caused a considerable destruction of fruit.

So far as observed it does not affect the green tomato, but rather at the point when it just begins to color, and from that on to complete ripening. When, however, an attack is once made, the malady spreads so rapidly as to occasion serious loss before the fruit can be gathered.

The disease shows itself upon the tomato as sunken, discolored spots, each with a dark center, becoming black. These spots increase in size, or by confluence cover a large portion of the decaying fruit. Over this area the fruit is black and shrunken, flattened or depressed, surrounded by a shrunken, corrugated, discolored skin; the dark centers due to the gregarious acervuli with their dark setæ.

The disease is easily and quickly produced by introducing the spores within a puncture made by a sterilized needle, but no results have yet come from repeated attempts to produce the disease by sowing the spores upon the uninjured surface of either ripe or green tomatoes. The fungus causing the trouble is a species of *Colletotrichum*. It is clearly distinct from *C. nigrum* E. & Hal., found by Dr. B. D. Halsted on cultivated peppers, which, however, it somewhat resembles. Attempts to grow the tomato fungus on peppers, even by introducing the spores of the latter beneath the skin, were unsuccessful.

The following botanical description of the fungus is appended:

Colletotrichum Lycopersici, n. sp.

Spots depressed, circular, slightly discolored, center black, 5–10 μ in diameter, afterwards becoming irregular and confluent. Acervuli abundant, densely gregarious, rusty brown to black, applanate, 95–150 mm. in diameter. Setæ abundant, fulignous, generally curved, rarely undulate or straight, often geniculate in places, gradually tapering, septate, length 65–112 μ, about 5 μ at base. Spores oblong 16–22μ×4, average 18–20×4, ends subacute, hyaline, generally containing two to three oil drops which stain brown with osmic acid. Basidia short, slender, 30–40 μ, arising from a well-developed stroma. On fruit of cultivated tomato.

A LEAF SPOT OF CELERY.

Not long since some celery leaves were brought into my laboratory by a local gardener with the complaint that his celery plants were suffering badly. To general appearance the affection seemed to be the ordinary leaf blight, (*Cercospora Apii*, Fres.), but closer observation showed the spots to be covered with numerous black pustules, which upon further examination proved to be the pycnidia of a *Septoria*.

Examinations were at once made in other celery gardens, and in all the same disease was found. The effect upon the plant is very similar to that of the well known leaf blight, causing in extreme cases a complete wilting of the leaves, and in the case of younger growths a complete destruction of the entire plant.

The spores, which germinate readily in water, were sown upon healthy leaves with the result that in fifteen days the characteristic spots were produced at the points of infection, upon which were developed pycnidia containing the spores of this fungus. The fungus of the disease is apparently distinct from *Septoria Pastinacæ*, West, and from *S. pastinacina*, Sacc., both found on *Pastinaca sativa*, L.; the former species having larger and septate spores, while the *Septoria* on celery is to all appearance non-septate. The latter species differs in having much smaller spores (20–30μ×7–1 μ) and larger pycnidia (120–150 μ).

The fungus, according to the opinion of Mr. J. B. Ellis, is more closely related to *Septoria Petroselini*, Desm., but is probably not identical with it.

Through Dr. D. H. Halsted I am informed that Briosi has named a variety of the last species, i. e. *S. Petroselini*, var. *Apii*, which may be the form in question, but in the absence of specimens, the writer has no way of proving the point.

Whether the form in question is a new species, in which case it might be named *Septoria Apii*, or simply the above variety, is unimportant. The fact remains that the presence of this disease is noteworthy and it is therefore brought to the attention of mycologists.

The fungus is described as follows:

Spots amphigenous, white to tawny, irregular, becoming confluent, the entire leaf finally wilting. Pycnidia black, innate, scarcely erumpent, amphigenous, 74-100 μ in diameter, mostly 90μ, globose-subglobose, loosely gregarious. Sporules hyaline, curved-flexuose, 25-40 μ × 2-2.5 μ, apparently non-septate or septulate, eguttulate, one end commonly attenuate.

On leaves of cultivated celery.

BLIGHT OF WATERMELON VINES.

For some years past growers of watermelons in the southern part of Delaware have suffered badly from a disease which seems heretofore to have escaped the notice of mycologists.

During the present season a noted grower in this section experienced almost a complete failure of his crop through the same trouble. The malady was not brought to my notice until rather late in the season, and hence it was difficult to make the extended field observations which would be advisable.

Present observations have demonstrated, however, that the trouble is due to a parasitic fungus, most destructive in its habit, and capable of widespread financial disaster wherever it gains foothold. Young plants, 10 feet or less in length, attacked by the fungus, generally go down completely, while older plants suffer through the more or less complete destruction of their foliage and other tender parts of the vine, preventing completely the further development of the melon. Nor do the young fruit, up to the size of marbles, and fruit buds escape, such parts turning black, and finally developing the mature pycnidia of the fungus.

In short, the disease attacks leaf, leaf stalk, stem, tendrils, fruit buds and blossoms. It shows itself upon the leaves as black, circular or irregular spots, marked by concentric ridges. These spots increase in size and coalesce so as to cover a large part or all of the leaf. On leaf stalks and tendrils as elongated dark lines, which increase in breadth so as to involve the part and cause it to turn black and shrivel. Similar elongated spots, which afterwards become white in the center, mark its stems, but in the case of these woody growths, the damage I have not found sufficient in the specimens examined to be serious, the injury being mostly confined to the tenderer parts of the vine.

The spores of the fungus, which germinated readily, were sown upon a young watermelon plant, grown from seed in the greenhouse; in three days the plant thus affected began to show signs of disease; in eighteen days the plant was completely dead. An examination of the blackened and wilted leaves showed the pycnidia of the fungus containing the characteristic and well developed sporules.

The check plant uninfected remained healthy, with no signs of the disease.

The fungus causing the above trouble is a member of the genus *Phyllosticta*, although from the character of the sporules, which are sometimes uniseptate and hyaline, it is questionable whether it might not, following Saccardo, be classed as an *Ascochyta*. It seems to differ from either *P. orbicularis*, E. and E., or *P. curbitracearum*, Sacc., found on *Cucurbita Pepo*, L., and is here described as new.

Phyllosticta Citrullina, n. sp.

Spots circulur, irregular, black, concentrically ridged, becoming confluent. Pycnidia amphigenous, brown, immersed, scarcely erumpent, membranaceous, lenticular 75-131 μ, average of many measurements 107 μ × 67 μ. Sporules 9-10.7 μ, average about 10 μ × 3.5 μ generally continuous, sometimes uniseptate, straight, slightly curved, ends obtuse, often biguttulate, hyaline.

On leaves and other parts of watermelon.

Delaware College, Newark, Del., Oct. 27, 1891.

Botanical Notes.

An extraordinary case of fasciation has just been brought me in a specimen of *Rudbeckia hirta* from Warwick, R. I. The plant is about eighteen inches high; the flattened stem, covered with numerous, well-formed leaves, is at its narrowest part over an inch in width, and only very gradually tapers to the *capitula*. The number of these which have consolidated it is quite impossible to determine. The resultant mass, allowing for curvature, must be all of five inches across. One lateral branch of two heads is separated from the main stem. A cross section of the stem exhibits a sort of watch-glass form, or it may be better compared to a dumb-bell. The very long petioles of the leaves is a noticeable feature. The disk is marked through much of its length by a longitudinal fissure. W. WHITMAN BAILEY.

Providence, R. I., June 30th, 1891.

Lespedeza striata. As supplementary to Dr. Porter's note in the October BULLETIN, I would say that I found it here in 1889, along a road. When first noticed it was a very small patch; this summer I found it along that same road for nearly a mile. It appears to be well pleased with our climate and will stay. As far as it has spread it stands very thick on the ground, completely covering it. JACOB SCHNECK.

Mt. Carmel, Ill.

Preliminary Check-List of the Flora of Crawford County, Pa. Mr. C. C. Mellor, of Pittsburgh, has obligingly sent me a copy of a 12-page pamphlet with the above title. It bears neither date, name of the author, nor place of publication. The pages are not numbered. The list gives the species arranged alphabetically, and their common names, but no definite localities. It is not included in my list of State and Local Floras published in Vol. 5, Annals New York Academy of Sciences.

N. L. BRITTON.

Plantæ Cultivatæ Exsiccatæ. (West Am. Sci. vii. 273, 274.) The Orcutt Seed and Plant Co. of San Diego, Calif., announce the commencement of a series of fascicles representing cultivated plants grown at San Diego. Fleshy parts of plants will be preserved in alcohol if desired, and sections of ligneous plants made upon request. The price of the first century, unmounted, has been placed at $10.00.

Index to Recent Literature Relating to American Botany.

A Letter from Dr. Geo. Engelmann to Dr. C. C. Parry. (West Am. Sci. vii. 271).

Anatomical Characters of North American Gramineæ.—A Study of Some. Theo. Holm. (Bot. Gaz. xvi., 166-171, 219-225, 275-281, 5 plates).

An anatomical study of species of *Uniola, Distichlis*, and *Pleuropogon.*

A Remarkable Orange Tree. W. W. Bailey. (Bot. Gaz. xvi. 311, 311).

The author cites an instance in which an orange tree, completely girdled, lived and bore fruit for at least seven years, although there was no connection between the upper part of the tree and its roots except through the heart wood. The tree finally yielded when a vigorous young sprout came up from the root.

Aristolochia gigas. W. B. Hemsley. (Gard. Chron. x. 552, f. 75).

Bacteria of the Melons. Byron D. Halsted. (Bot. Gaz. xvi., 303-305).

Read before Sec. F., A. A. A. S., Washington meeting, Aug., 1891.

Botanical Jottings. A. Alexander. (Journ. and Proc. Hamilton Asso., Part vii., 79-85).

Cleistogamy in Polygonum acre. T. H. Kearney, Jr. (Bot. Gaz., xvi. 314, illustrated).

Epiphyllum Gærtneri. (Bot. Mag. t. 7201).

Flora of St. Helen's Island, Montreal—Notes on the. D. P. Penhallow. (Can. Rec. Sci. iv. 369-372).

A list of some sixty native and introduced plants.

Further Notes on the Mutilation of Flowers by Insects. J. Schneck. (Bot. Gaz. xvi. 312, 313).

The author adds that he has seen *Xylocopa Virginica* visit *Pentstemon pubescens, P. lævigatus, Pontederia cordata, Astragalus Canadensis* and *Trifolium pratense.*

Helianthus mollis. Thos. Meehan. (Bot. Gaz. xvi. 312).

A note on variation according to environment.

Ilex Cassine, the Aboriginal North American Tea. E. M. Hale. (Bull. No. 14, Div. Bot. U. S. Dept. Agric., illustrated).

This is an account of *Ilex vomitoria*, Ait., with figure of the species in fruit and a map of the United States showing distribution. The history of its use by the North American Indians as a beverage—the so-called "black drink"—is fully described, and copious references are given to early explorers who have written in regard to it.

Ipomœa pandurata. Geo. H. Shull. (Am. Gard. xii. 637, 638, illustrated).

Both *Ipomœa pandurata* and *Calystegia sepium* are figured, and the warning is given that they have been introduced by unscrupulous dealers as "grand novelties."

List of the Plants of Arkansas. John C. Branner and F. V. Coville. (Ann. Rep. Geol. Surv. Ark. Vol. iv. 155-242.)

This is a catalogue of plants of the state, giving localities for the rarer or more interesting species, and prefaced by an account of the sources from which the information used in its preparation has been derived, including remarks on the bibliography and explorations. Mr. Coville spent several months of the summer of 1888 about Little Rock and in Independence Co., and thus became familiar with the general features of the flora. The system of nomenclature adopted is that of the "oldest specific or varietal names under whatever genera they may originally have been employed. On this principle, Prof. William Trelease, Director of the Missouri Botanical Gardens at St. Louis, has kindly revised the list." We note the following binomials here used for the first time: *Castalia reniformis* (DC.) for *C. tuberosa* (Paine) Greene; *Arabis Virginica* (L.), for *A. Ludoviciana*, Meyer; *Hosackia sericea* (Pursh.) for *H. Purshiana*, Benth.; *Neptunia virgata* (Bartr.) for *N. lutea*, Benth.; *Schrankia Intsia* (Walt.), for *S. uncinata*, Willd.; *Desmanthus Cooleyi* (Eaton) for *D. Jamesii*, T. and G.; *Acacia filicoides* (Cav.), for *A. filicina*, Willd.; *Vernonia gigantea* (Walt.), for *V. altissima*, Nutt.; *Vernonia geraniæfolia* (Walt.), for *V. angustifolia*, Michx.; *Vernonia marginata*, (Torr.), for *V. Jamesii*, T. and G.; *Aphanostephus skirrobasis* (DC.), for *A. Arkansana*, Nutt.; *Berlandiera pumila* (Michx.) for *B. tomentosa*, Nutt.; *Marshallia trinervia* (Walt.) for *M. latifolia*, Pursh.; *Polypteris sphacelata* (Nutt.) for *P. Hookeriana*, Gray; *Sabbatia dichotoma* (Walt.) for *S. calycosa*, Pursh.; *Phacelia dubia* (L.), for *P. parviflora*, Pursh.; *Herpestis acuminata* (Walt.) for *H. nigrescens*, Benth.; *Dianthera ovata* (Walt.) for *D. humilis*, (Engelm and Gray); *Calamintha glabra* (Nutt.) for *C. Nuttallii*, Benth.; *Schedonardus paniculatus* (Nutt.) for *S. Texanus*, Steud.; *Eragrostis interrupta* (Nutt.) for *E. oxylepis*, Torr.

The work is a valuable contribution to geographical botany, and cannot fail to give an impetus to the study of plants in the great area which it covers. N. L. B.

Mutilation of the Flower of Tecoma radicans. J. Schneck. (Bot. Gaz. xvi. 314, 315).

A note to the effect that *Icterus Baltimore* is responsible for the mutilation of flowers of this plant while in search of nectar.

Native Trees and Shrubs of Nebraska—A Preliminary Report on The. C. E. Bessey. (Bull. Agric. Exp. Sta. Neb. iv. Art. No. 4).

A list of sixty-one trees and sixty-four shrubs, with notes on habit, general appearance and distribution, both geographic and with reference to elevation.

Notes on California Plants.—I. S. B. Parish. (Zoë, ii. 116, 117).

An account of the manner in which the tuberiferous roots are produced in *Hydrocotyle Americana* and *H. prolifera.*

On a New Horizon in the St. John Group. G. F. Matthew. (Can. Rec. Sci. iv. 339-343).

Contains an interesting discussion in regard to the probable position of the disputed organism *Dictyonema*, whether as plant or animal.

Pentstemon Haydeni, n. sp. Sereno Watson. (Bot. Gaz. xvi. 311).

Description of a new species, from Wyoming and Nebraska.

Phacelia campanularia. (West Am. Sci. vii. 270).

The fact is noted that this California plant has received a first class certificate from the Royal Horticultural Society of England, where it was recently introduced.

Pleurothallis immersa. J. D. Hooker. (Bot. Mag. t. 7189).

Picea pungens. (Gard. Chron. x. 547, f. 73, 74).

Ravenelia from Alabama—A new. G. F. Atkinson. (Bot. Gaz. xvi. 313, 314).

Ravenelia Cassiæcola is described as new.

Sling-Fruit of Cryptotænia Canadensis—The. E. J. Hill. (Bot. Gaz. xvi. 299-302).

An account of the manner in which this species disseminates its fruit by mechanical action.

Talauma macrocarpa, Zucc., the Yoloxochitl. Alfonso L. Herrera. El Estudio [Mexico], Tom. iv. No. 4.

The botanical and medical history of the plant is given.

Triassic Plants from New Mexico—Notes On. Wm. M. Fontaine and F. A. Knowlton. (Proc. U. S. Nat. Mus. xiii. 281-285, Pl. xxii-xxvi).

Two new species are described and figured, *Equisetum Abiquiense* and *E. Knowltoni.* *Zamites Powellii* is also figured as a new species. Its affinities are with *Z. occidentalis* and *Z. Feneomis.*

Vitality of Some Annual Plants—On the. Theo. Holm. (Reprint, Am. Journ. Sci. xlii. 304-307, Pl. x).

The author refers to the fact that some annual plants at times fluctuate in their cycle of life so as to appear biennial or even perennial, according to environment. *Hypericum nudicaule*, Walt., *Delphinium Consolida*, L., *Cyperus flavescens*, L., *Carex cyperoides*, L., *Tragus racemosus*, Hall, *Arabis dentata*, T. and G., *A. lyrata*, L., and *A. laevigata*, Poir., are noted.

Vegetation of "Burns"—The. T. S. Brandegee. (Zoë, ii. 118-122).

An interesting contribution to the literature of "fire weeds."

Viburnum. H. H. Rusby. (Reprint from Drug. Bull. July, 1891, illustrated).

Viburnum prunifolium is described and figured.

What the Station Botanists are Doing. B. D. Halsted. (Bot. Gaz. xvi. 288-291).

Winter Studies of the Pine Barren Flora of Lake Michigan, I—VI. E. J. Hill. (Gard. and For. iv., 159, 160; 195, 196; 208; 232, 234, 278, 279; 304).

Mention is made of *Celastrus scandens*, *Rhus Toxicodendron*, *R. typhina*, *R. Canadensis*, *Rosa blanda*, *R. humilis*, *R. Caroliniana*, *R. Engelmanni*, *Arctostaphylos Uva-Ursi*, *Cassandra calyculata*, *Vaccinium macrocarpon*, *Chimaphila maculata*, *C. umbellata*, *Gaultheria procumbens*, *Mitchella repens*, *Pyrola rotundifolia*, *P. elliptica*, *P. chlorantha*, *P. secunda*, *Cornus Canadensis*, *Linnæa borealis*, *Gaylussacia resinosa*, *Vaccinium corymbosum.* *V. vacillans*, *V. Pennsylvanicum* and *Rubus*

hispidum, either in regard to their fruit or evergreen leaves. Amongst the mosses and lichens to which attention is called in this article are *Cladonia rangiferina*, *Ceratodon purpureus*, *Polytrichum commune* and *Thelia Lescurii*. The forest trees are described.

Yucca rupicola. J. G. Baker. (Bot. Mag. t. 7172).

Yucca filifera. J. G. Baker. (Bot. Mag. t. 7197).

Proceedings of the Club.

MEETING OF NOVEMBER 10TH, 1891.

Mr. Hogg in the chair and twenty-two persons present.

The following were elected active members:

Miss Alice L. Sterne, Mrs Annie Chambers Ketcham and Mr. J. E. Torrey.

The following resolutions were adopted by the Club and a copy ordered to be sent to Mrs. Northrop.

In view of the death on June 26th, 1891, of John I. Northrop, a member of this Club and Instructor in Zoölogy in Columbia College,

Resolved (1), That we put on record our high sense of his simple, earnest and straightforward manliness, his ardor and indefatigable industry in the pursuit and study of natural science, and the great loss which our own department as well as that of zoölogy, has sustained in the early departure of one who gave promise of reaching the highest attainments.

(2), That we extend our sincere sympathy to his bereaved widow and family friends, and to all our fellow scientists, who in common with ourselves lament his sad and untimely end.

The paper announced for the evening, "The Flora of the Higher Catskills," was then read by Dr. Rusby, illustrated by specimens of most of the species alluded to.

MEETING OF NOVEMBER 25TH, 1891.

Mr. Hogg in the chair and twenty-seven persons present.

The following were elected active members:

Mr. Jacob M. Rich and Mrs. Helen Cooley.

The announced paper of the evening on "Recent Discoveries Concerning Lichens," was read by Dr. Emily L. Gregory.

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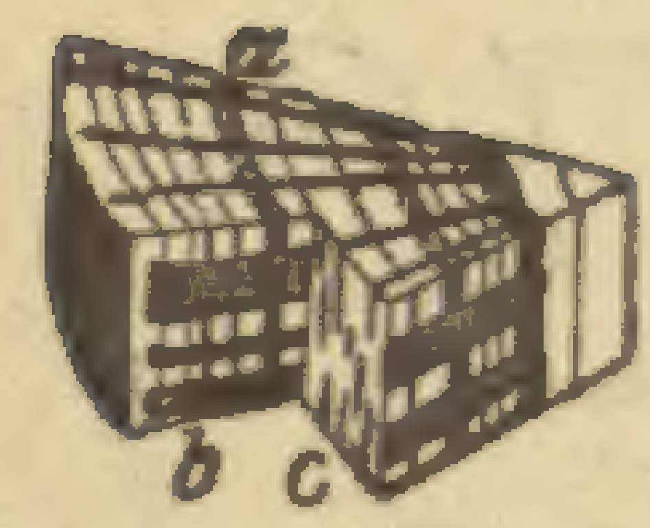

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